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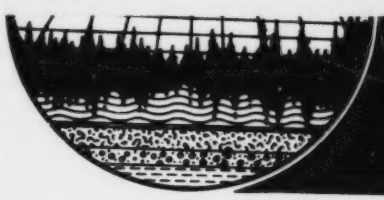

DIRECTORATE DIRECTION GENERALE DES TERRES

THE IMPACT OF FEDERAL ACTIVITIES ON FRUITLAND USE: ANNAPOLIS VALLEY

WORKING PAPER No. 21

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Dear Reader:

This paper is published as a preliminary document for a national overview study of federal impacts on Canada's fruitlands. If you are aware of any errors or omissions in the text or if you have general comments, we would be pleased to hear from you at the following address:

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We hope you find this report to be informative and useful.

Sincerely,

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Canada

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THE IMPACT OF FEDERAL ACTIVITIES ON FRUITLAND USE: ANNAPOLIS VALLEY

Paul D. Bircham

February, 1983

Lands Directorate
Environment Canada

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PREFACE

This investigation of the impact of federal activities on the use of fruitland in the Annapolis Valley is one of three case studies being prepared as part of a national overview of Canada's fruitlands. The national study is in turn part of an ongoing program of research into the effects of federal activities on land use. This research is being conducted by the Land Use Analysis Division of the Lands Directorate, Environment Canada, in support of the Federal Policy on Land Use (Government of Canada, 1981). The goal of the Policy is to ensure that federal policies and programs and the management of federal land contribute to the wise use of Canada's land resource. The Policy incorporates a series of land-use policy positions and guidelines to be followed by federal departments and agencies in carrying out their programs. Implementation of the Policy and discussions with provinces on land use are co-ordinated by the Interdepartmental Committee on Land.

A representative set of the estimated 800 federal government policies and programs, which (intentionally or not) affect the ways in which people use land, is being examined systematically for the committee. Three different types of studies are being pursued:

1) investigations of the land-use impacts of a specific policy or program (e.g., small-craft harbours, see McCuaig, et al., 1981);

2) inventories of all land-use impacts within a selected geographical area (e.g., the Windermere Valley in BC, see McCuaig and Manning, 1980);

3) examinations of the federal role in a particular land-use problem or issue of which the present fruitlands study is an example.

The objectives of these studies are to document the activities of federal programs, to relate the programs to users of land as well as land-use sectors of the economy, and to analyze the contribution of these federal activities to the decisions made by the owners and users of land. An overview of progress in the development of these studies has been prepared by McCuaig and Bircham (1981).

ABSTRACT

This paper presents an evaluation of the nature and importance of the federal role in the use and management of fruitlands in the Annapolis Valley, Nova Scotia, and forms part of a national overview involving parallel investigations in the Okanagan Valley of British Columbia and the Niagara Region in Ontario. Each study examines the present status of fruitland use, recent trends in its use, and the factors causing such trends. The role of those federal policies and programs, which may provide assistance or create or perpetuate problems, is assessed in terms of direct demands on fruitland, production economics, and the fruit-handling and marketing system.

The principal hypothesis of this study is that federal policies and programs have significant effects on changes in the use, level of maintenance, and allocation of fruitland. In general, federal activities have influenced the amount of orchard area, encouraged the intensification of land use and management on better quality land, and increased the productivity and capitalization of orchard land. On the other hand, high interest rates and federally-subsidized industrial development in the Annapolis could adversely affect fruitland use.

By providing enhanced knowledge of the federal relationship to these special resource lands, these three case studies support the Federal Policy on Land Use (Government of Canada, 1981). More informed development of federal programs can help to ensure the continued contribution of these lands to national food requirements.

RESUMÉ

Le présent document comprend les résultats d'une évaluation de la nature et de l'importance du role fédéral en matière d'utilisation et de gestion des terres fruitières de la vallée de l'Annapolis (Nouvelle-Ecosse), et fait partie d'une vue d'ensemble nationale comptant des renseignements semblables sur la vallée de l'Okanagane (Colombie-Britannique) et la région de la Niagara (Ontario). Chaque étude vise l'état de l'utilisation des terres fruitières, le changement qu'est en train de subir cette utilisation, et les causes de ce changement. On évalue le role de tous les programmes et politiques du gouvernement fédéral qui peuvent etre utiles ou poser ou maintenir des problèmes, des points de vue des demandes directes imposées aux terres fruitières, de l'économie de la production et du système de transformation et de commercialisation.

Les études se fondent principalement sur l'hypothèse selon laquelle les politiques et les programmes fédéraux ont des incidences importantes sur le changement d'utilisation, le degré d'entretien, et la répartition des terres fruitières. En général, les activités fédérales ont influé sur la superficie consacrée aux vergers, encouragé l'intensification de l'utilisation et de la gestion de terres de meilleure qualité, et fait augmenter la productivité et la rentabilité des terres fruitières. Par contre, les taux d'intéret élevés et l'expansion industrielles subventionnée par le gouvernement fédéral dans la vallée de l'Annapolis peuvent nuire à l'utilisation des terres fruitières.

Puisqu'elles permettent de mieux connaitre les rapports entre l'activité fédérale et les terres de choix en question, les trois études de cas susmentionnées appuient la Politique fédérale sur l'utilisation des terres (Government of Canada, 1981). L'élaboration des programmes fédéraux de façon plus avisée peut aider au maintien de la contribution des terres fruitières à la réponse aux besoins alimentaires nationaux.

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METRIC CONVERSION GUIDE

All measures in this report are in metric units. A conversion table of all units utilized is included below:

AREA

1 hectare (ha)	= 2.47 acres / 10,000 square metres
0.40 ha	= 1 acre

LENGTH

1 metre (m)	= 3.28 feet / 39.37 inches / 100 centimetres
0.30 m	= 1 foot
1 kilometre (km)	= 0.62 mile / 1,000 m
1.60 km	= 1 mile

MASS OR WEIGHT

1 kilogram (kg)	= 2.20 pounds / 1,000 grams
0.45 kg	= 1 pound
1 metric tonne (t)	= 2,205 pounds / 1.1 short tons / 1,000 kilograms
1 t	= 52.5 bushels of apples
1 t	= 44.1 bushels of all other tree-fruit
0.019 t	= 1 bushel of apples
0.020 t	= 1 bushel of other tree fruit

LIST OF ACRONYMS USED

ARDA	- Agricultural Rehabilitation and Development Act
CAMDF	- Canadian Agricultural Market Development Fund
CLI	- Canada Land Inventory
CMHC	- Canada Mortgage and Housing Corporation
DREE	- Department of Regional Economic Expansion
EEC	- European Economic Community
FCC	- Farm Credit Corporation
GATT	- General Agreement on Trade and Tariffs
ITC	- Department of Industry, Trade, and Commerce
LRIS	- Land Registration and Information Service
PEMD	- Program for Export Marketing Development
RDIA	- Regional Development Incentives Act

1.0 INTRODUCTION

In Canada, tree-fruit production is generally near its climatic limit. Only through a fortunate coincidence of favourable climate and soil are there even limited areas of suitable land. The Annapolis Valley of Nova Scotia now produces about 10% of the nation's apple crop. The area in tree-fruit production in the valley has declined by two-thirds and production by over half since World War II. Despite its reputation as a prime apple-producing area, the valley is now only the third major apple region in Canada after the Okanagan Valley and the South Montreal Plain. (Other important regions include the vicinity of Georgian Bay, the north shore of Lake Ontario, and the St. John River Valley.)

The Annapolis Valley remains, nevertheless, the major supplier of apples in Atlantic Canada; orcharding continues to be an important local activity. In 1981, production of 54,475 tonnes (about 2.9 million bushels)[1] of apples and small quantities of pears, plums, peaches, and cherries provided a total farm value of over $11.1 million (Nova Scotia Department of Agriculture and Marketing, 1981). This represented 5.1% of total farm cash receipts for Nova Scotia and about one-eighth of all 'value added' by agriculture in the Annapolis Valley, the richest agricultural region of the Maritimes (Robinson, 1982). Local processing of about 60% of the Annapolis fruit production further contributes to its significance in the valley.

The principal hypothesis of this study is that the programs and policies of the federal government significantly affect changes in the use, maintenance, and allocation of fruitland in the Annapolis Valley. Enhanced knowledge of the relationship of federal programming to the use of special Canadian resource lands, such as the Annapolis, should permit more informed decisions regarding the development, modification, and assessment of those federal programs affecting the continuing ability of these lands to contribute to national food requirements.

This study has three main objectives: 1) to identify the key issues with respect to fruit-growing and fruitland in the Annapolis; 2) to obtain information about all relevant government programs; and 3) to assess the implications and importance of federal programs relative to the use and management of these fruitlands. (Only tree-fruit and grapes are being considered at the national level; therefore berry production, although a significant land use in Nova Scotia, is not considered in this study.)

Two primary approaches have been utilized. The first consists of following specific programs through their administrative mechanisms to where they influence orchard land. Approximately three dozen key federal programs, considered to have the most significant impacts on fruitlands, have been followed through to the point of their effects on land use. The second approach has consisted largely of a series of interviews

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[1] See "Metric Conversion Guide," previous page.

with experts in the Annapolis, including administrators of federal and provincial programs and regulatory bodies, the Nova Scotia Fruit Growers' Association, and the Annapolis fruit-processing industry. Relevant data for both these approaches have also been drawn from the Census, fruit production information, trade statistics, and several other sources. Three types of federal programs have been investigated: 1) those directly affecting the supply of and demand for fruit-growing land; 2) those which influence fruitland use through the economics of fruit production; and 3) those which affect fruitland use throughout the marketing of fruit and fruit products.

The collected data has been used to prepare a draft paper dealing with these impacts, which has been circulated to many of those interviewed for review. This feedback stage has been viewed as a critical and integral part of the study and has resulted in numerous clarifications and corrections and the inclusion of much new material in this report. A full list of reviewers is included in the acknowledgements. This working paper too is viewed as an opportunity for feedback for the final overview paper.

The development of the Annapolis Valley's fruit industry is described and the present status of the industry is documented in Chapter 2. Chapter 3 investigates the land base of the orchard industry, its physical limits, the encroachment of competing land uses on fruitlands, and the role of land-use planning and development controls. The economics of fruit growing in the Annapolis Valley and the ways in which changes over the past several decades have influenced fruit production and land management are then analyzed in Chapter 4. In Chapter 5, the marketing and distribution system for Annapolis fruit is assessed in terms of its effects on the industry and therefore on the demand for land for fruit production. In the final chapter (6), the impacts of federal activity on fruitland in the Annapolis are summarized in relation to maintenance of the land base, the economics of farming, and the marketing system, as well as the future prospects for the industry and its land use.

2.0 DEVELOPMENT OF THE ANNAPOLIS ORCHARD INDUSTRY

> ... the settlers who came over from Massachusetts in 1760 and were granted lands and abandoned farms of the expelled French, extending from Moselle to Nicteaux found many apple and pear trees in the gardens.... A great impetus was then given to fruit culture.... This is notably the case of the fine old orchard of Stephen E. Bent of Bentville.... This farm in some seasons produces 1,000 barrels of merchantable apples. Some of these old trees are of immense size and produce a great quantity of apples (Starrat, 1886).

Fruit-growing in the Annapolis Valley, the oldest apple-producing area in North America, dates from Acadian settlements on the dykelands around the Minas Basin at Grand Pre and Canard as early as the seventeenth century (Figure 2.1).[1] Around 1760, shortly after the expulsion of the Acadians, the land was taken up by settlers from New England called "Planters" and later by Loyalists who, settling largely in Annapolis County, introduced and developed new varieties. Development of fruit-growing was delayed by transportation difficulties, as well as the greater profitability of alternative activities, such as the fur and lumber exploitation. With the development of market access by the Windsor-Halifax railway (completed in 1869) and the Annapolis River/Bay of Fundy, the fruit-growing industry began to develop. The British market, opened in 1849, expanded rapidly so that, by the 1890s, annual shipments to the London fresh market had reached 100,000 barrels (5,700 tonnes). To achieve this, there were substantial increases in production, in this period, rising from almost 12,000 tonnes in the early 1870s to as much as 72,000 tonnes at the turn of the century (Morse, 1952). By the 1920s, the apple industry had become the economic mainstay of the Annapolis.

Early success in the British market led Annapolis growers to cater almost exclusively to this outlet. They produced a culinary-quality apple, one essentially grown for its ability to make an ocean passage without refrigeration, packed in barrels. The structure of the British market allowed Nova Scotia's growers and shippers to market their apples independently. The profitability of this marketing approach, however, was eventually eroded by apples from British Columbia, Britain, and other countries. During and after World War I, British import restrictions, continued stiff competition there, and over-production led to a general decline in the Annapolis industry.

Access to the British market by Nova Scotia's growers was also severely restricted during World War II and never recovered to any substantial extent. The federal government subsidized development of a local processing industry to take up the excess supply; since that time, processed apples have generally accounted for about 60% of Nova Scotia's apple production. Federal and provincial subsidies in the post-war period also assisted the

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[1] The following discussion is based on Morse (1952), Krueger (1965, 35-37), Cornwall (1957, 29-32), Mulder (1964), Kinsman (1979), and County of Kings (1979).

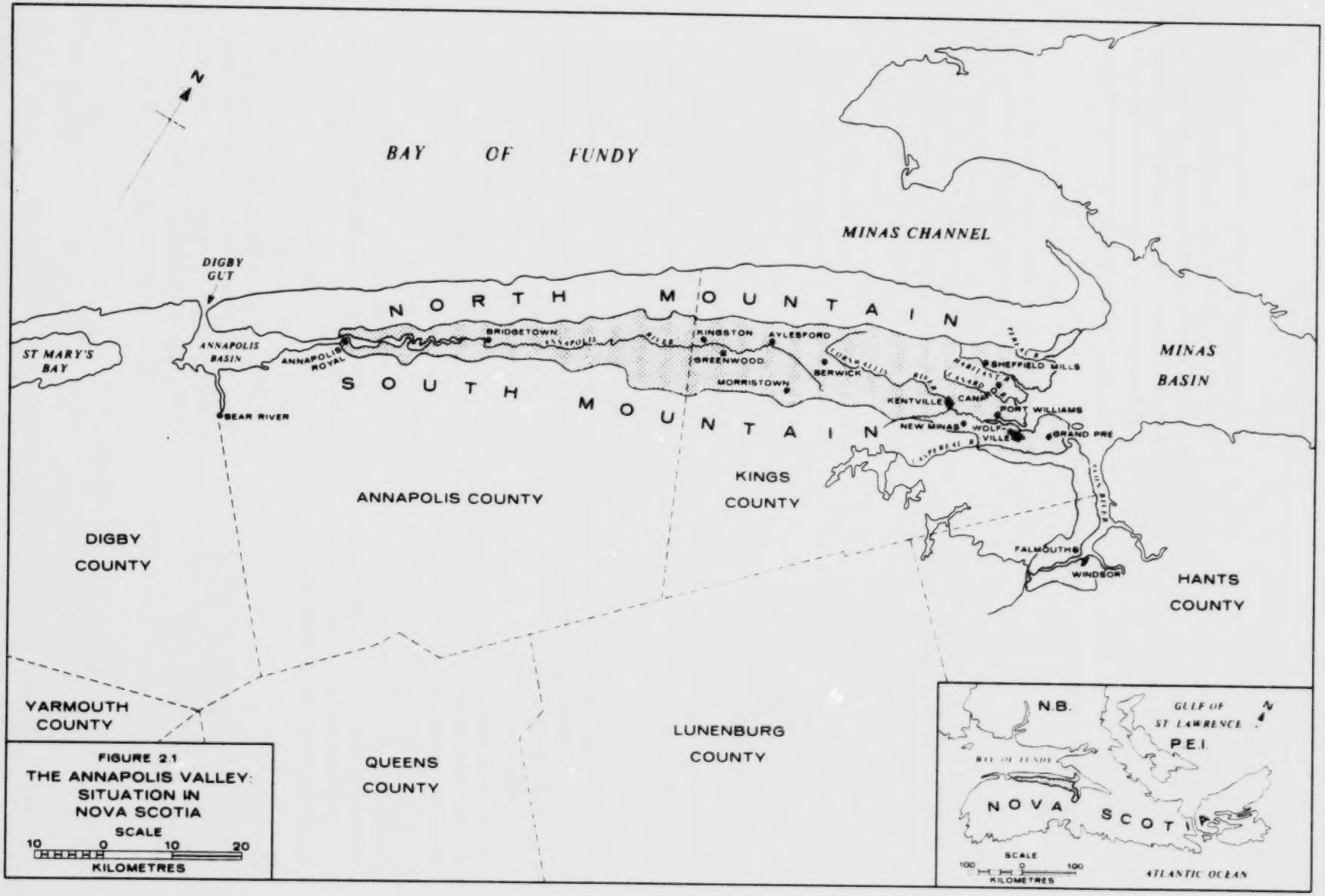

FIGURE 2.1
THE ANNAPOLIS VALLEY: SITUATION IN NOVA SCOTIA

adaptation of the industry by cutting production, aiding the withdrawal of uneconomic producers and orchards, restructuring the tree-variety mix, and improving fruit handling. Production declined dramatically from about 105,000 tonnes in the 1935 to 1944 period to less than 40,000 in the 1950s.

Repenetration of the British and European markets in the early 1960s, by an improved fresh product as well as canned apples, created a temporary boom, which ended by 1973 with Britain's entry into the European Economic Community (EEC). From a level of about 56,000 tonnes through the 1960s, production reached a low of 37,000 tonnes in 1972 and has since remained near 45,000 tonnes per annum. In the late 1970s, the industry recovered somewhat, due to strong, stable prices for fresh apples and good, stable returns to the processing sector. Substantial planting has taken place, subsidized from 1976 to 1981 under a federal-provincial agreement. Much increased production should occur once these trees reach bearing age.

The valley currently produces about 10% of Canada's apples (9.3% in 1980) and a little less than 5% of the pears (Statistics Canada, 1981a). The 4,700 hectares in fruit production in the valley in 1981 constituted 10.1% of the fruitland in Canada, a proportionate reduction in area of about three-quarters, from the 40.8% of Canada's fruitland in 1931-38 (Morse, 1952; Statistics Canada, 1982c). The valley's proportion of Canada's apple trees has also declined by more than half, from 23.4% in 1941 to 9.8% in 1981 (Statistics Canada, 1982c).

3.0 THE LAND BASE

The supply of land for fruit production, the demands on that land, and the effect of the federal government on both are the focus of this discussion on the Annapolis Valley's fruitland base. The physical base of the industry is described in terms of those areas with suitable climate and soils (Section 3.1). The evolution and current use of fruitland is documented and discussed in terms of orchard location and total area (3.2). The nature and extent of non-agricultural pressures on the fruitland resource are then outlined (3.3). Finally, the importance and extent of the direct impacts on the use of fruitland through federal programs, policies, and land ownership are assessed (3.4).

The tree-fruit growing area of Nova Scotia is located within the Annapolis-Cornwallis Valley, a 105 kilometres long, narrow erosion-caused trough which extends from the Minas Basin to the Annapolis Basin, parallel to the Bay of Fundy (Figure 2.1; Cornwall, 1957, 23-27; Krueger, 1965, 34). The lowlands adjacent to Minas Basin and stretching south along the Avon River to Windsor-Falmouth also form part of the fruitland area. The valley tapers from a width of approximately 13 kilometres at Kentville-Wolfville in the eastern end to 3 kilometres at Annapolis Royal in the west. Towards the Bay of Fundy, the "North Mountain" rises 235 metres; below 60 metres, the mountain slopes gradually to the valley floor. The less-defined slope of the "South Mountain" marks the edge of an extensive highland area.

In 1972, roughly 50% of the 185,000 hectares of potential agricultural land of the valley, virtually all Canada Land Inventory (CLI) agricultural capability classes 2 to 4, was in agricultural use (Arbour, 1980). About 84% of this agricultural land was used for improved pasture or forage crops. The mixed farms of the valley produce dairy products, poultry and other livestock, small fruit, vegetables, hay, grains, and tobacco, as well as tree fruit. In fact, only about 3% of the valley and 6% of it's cleared land was actually in orchard use in 1972.

3.1 Annapolis Fruit Production: The Land Supply

3.1.1 Climate

A fortunate juxtaposition of sea and topography has provided the Annapolis Valley with the most favourable climatic conditions for agriculture in the Maritime Provinces. A cool, humid, temperate climate is ameliorated locally by the Bay of Fundy, and the surrounding elevated areas provide wind protection as well as air drainage for frost protection. The frost record for apple-growing areas of the valley is as good as for any major apple-producing region on the continent (Table 3.1; Krueger, 1965).

The Bay of Fundy has a moderating effect on temperatures, especially close to the Annapolis Basin in the west and the Minas Basin in the east (Table 3.1). Areas of climatic suitability for tree fruits are illustrated in Figure 3.1, classified based on the relationship of crop requirements to

TABLE 3.1

Frost-Free Period and Temperature, 1941 to 1970

Station	Location	Mean Frost-Free Period (Days)	Temperature: Mean Daily June-Sept.	Temperature: Extreme Minimum
Annapolis Royal	west/floor	135	17.6°C	-27°C
Bridgetown	central/floor	125	ND	ND
Greenwood (Kingston)	central/floor	128	16.9°C	-30°C
Aylesford	central/floor	113	15.9°C	-27°C
Kentville	east/floor	129	16.8°C	-31°C
Sheffield Mills	east/north slope	135	16.9°C	-26°C
Wolfville	east/south slope	152	ND	ND

NOTE: ND--No data.

SOURCES: Compiled from Department of Environment (1972), 17-38; Kinsman (1979), 10.

climatic data (Kinsman, 1954) and on current orchard location (Kinsman, 1979). Cooler spring temperatures, due to slow melting sea-ice, delay blooming so that the spring frost damage is reduced to a minor hazard (Cornwall, 1957; Krueger, 1965). In addition, the slow cooling of sea water produces milder temperatures which last well into autumn, allowing fruit trees to acclimatize before the cold season thus minimizing winter damage to trees. The Annapolis usually escapes the low winter temperatures which characterize southern Quebec, as well as the rapid temperature changes of the Okanagan Valley (Bishop, 1957, 23). The severe winter of 1980-81, for example, caused extensive damage in Quebec and New Brunswick, but left Annapolis orchards virtually unscathed.

Air drainage from both the North and South mountains reduces frost risk on the slopes, where soils are the most appropriate for fruit production; frost risk is considerably higher on the valley floor. The highland areas provide wind protection, particularly for the north slopes, and funnel winds warmed by the Gulf Stream and Atlantic Ocean into the valley. Hurricane danger is infrequent, but is of some importance, as demohstrated by the 'blowdown' of about 80% of the crop by Hurricane Edna in 1954.

Mean temperatures in the range of 15° to 18°C for the months of June to September (Table 3.1), and cool temperatures towards the end of the growing season, limit the range of apple varieties that can be grown; Winesap and Yellow Newton, for example, will not ripen. On occasion, the maturity of such varieties as Red and Golden Delicious has been a problem. If, to compensate, growers delay harvest until late October, frost damage will result about

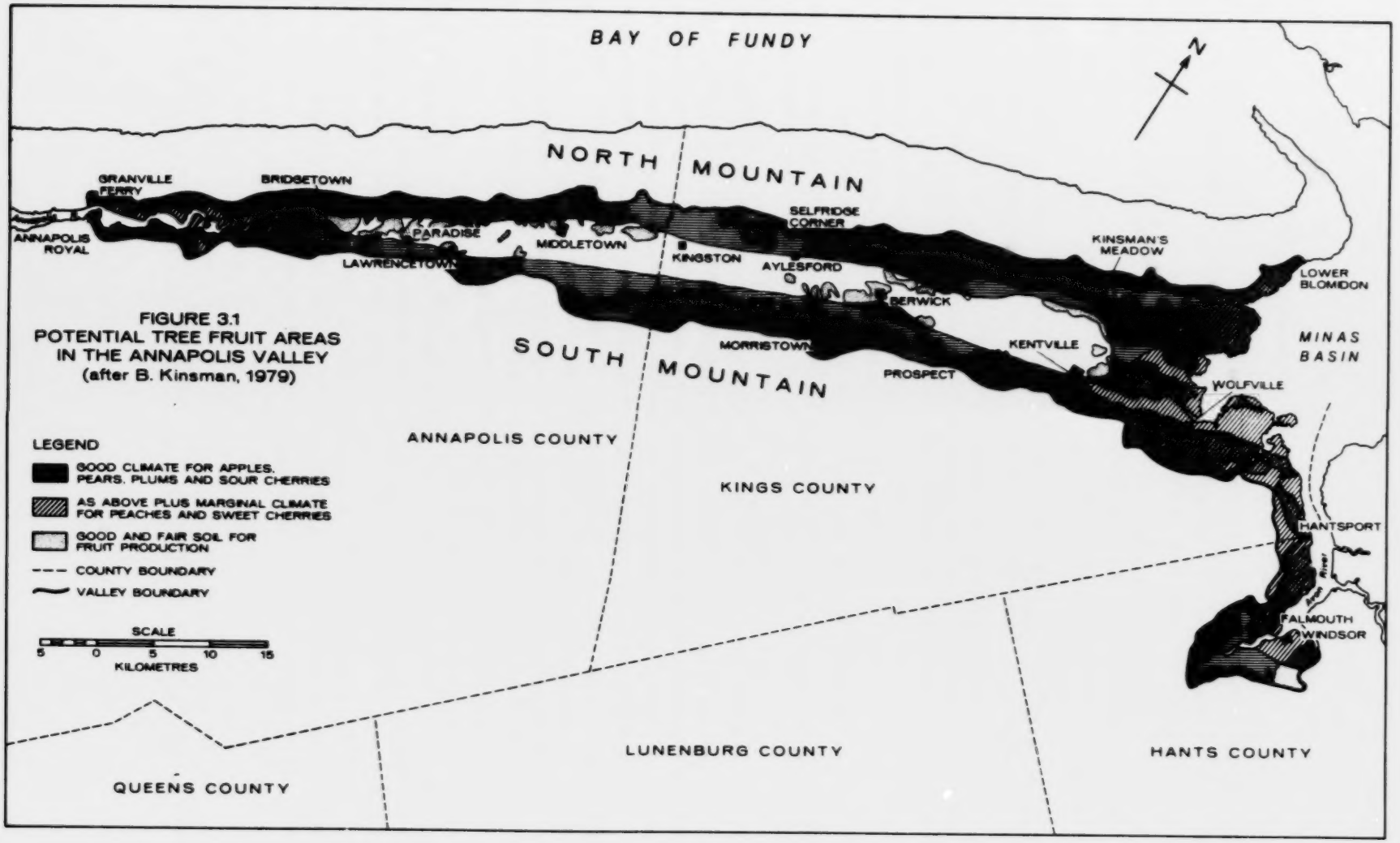

FIGURE 3.1
POTENTIAL TREE FRUIT AREAS
IN THE ANNAPOLIS VALLEY
(after B. Kinsman, 1979)

30% of the time (Krueger, 1965). On the other hand, McIntosh and Cortland usually grow well under these conditions. In fact, Annapolis temperatures may be better for short-season, northern varieties of red apples than those in warmer Canadian apple-growing areas (Crowe, 1982). Annapolis conditions ripen these varieties in fewer days.

The Annapolis area receives an average of 835 sunshine hours through the growing season (June to September), approximating levels in Quebec orchard areas. Although these values are less by 100+ hours than those of the fruit-producing regions of southern Ontario and the Okanagan Valley, sunshine is not a limiting factor (Bishop, 1957). Cool or wet conditions during blossom-season, however, tend to reduce the set of fruit in some years. The approximately 100 centimetres of annual precipitation, half of which occurs during the growing season, is generally sufficient for orcharding. Mid-summer droughts can reduce fruit size and therefore yield, while high humidity and frequent rains during the growing season increase disease problems, particularly apple scab, and the splitting of cherries. Fire-blight and Pear Psylla are not limiting factors for pear production here, as they are in much of North America.

3.1.2 Soils

Soils in the valley are leached podzols, with more than half being formed from glacial drift material. These soils can develop excellent potential for orchard and mixed farming and are generally CLI agriculture capability classes 2 and 3. The slopes of North Mountain, up to the sandstone/basalt boundary through the length of the valley, are used for agriculture. On South Mountain slopes, agriculture is interrupted by steep areas, rock outcrops, and extensive woodlots. Alluvial deposits along the Annapolis and Cornwallis rivers have developed loose, porous soils which are generally CLI classes 3 to 5, mainly unsuitable for either orchard or mixed-farming use, used in large part for vegetables.

Fruit-tree growth in a humid regime is optimal on light to medium-textured soils, that allow "deep and extensive rooting, are well drained, and have good capacity to hold water" (Kinsman, 1979, 18). The best fruit-growing sites in the valley are well-drained loams and sandy loams developed on glacial till. Almost 50,000 hectares, or about half of the potential agricultural land in the Annapolis Valley, is rated as "highly favourable" or "favourable" for fruit production (see Table 3.2 and Figure 3.1). (On a national perspective, these soils are classified as only "good" and "fair" respectively.) Fifty-four percent of the suitable area or 26,600 hectares are classed as "highly favourable" and consist of medium-textured, well-drained loams on glacial till. The remaining suitable soils, thosed classed simply "favourable," are generally well- and imperfectly-drained loams on glacial till (34%) and well-drained loams on water-lain till (12%). Well-drained, light-textured soils required for tender-fruit production (i.e., peaches, plums, and sweet cherries) amount to only about 25% of the area with capability for growing hardy fruit (i.e. apples).

3.1.3 Fruitland: The Physical Base

Most of the soils suitable for fruit production in the valley fortuitously are also

TABLE 3.2

Soil Suitability and Use for Fruit Production

Soil Suitability Class	Suitable Area hectares	Suitable Area %	Area in Orchard, 1978 hectares	Area in Orchard, 1978 %	Orchard Area as % of Area in Soil Suitability Class
Highly Favourable	26,579	54%	2,539	57%	9%
Favourable	22,292	46%	1,267	31%	6%
Total Suitable	48,871	100%	3,626	87%	7%
Marginal and Unsuitable	-----	---	522	13%	---
Total	48,871	---	4,148	100%	---

SOURCES: Compiled from Harlow and Whiteside (1943); Kinsman (1979), 19-20.

located in areas of appropriate climate (Figure 3.1). The fruitland base includes most of the south-facing slope of North Mountain (except the central area north of Kingston), the western portion of the valley near the Annapolis Basin, the eastern portion of the north-facing slope of South Mountain, and an eastern extension along the Minas Basin and Avon River as far as Windsor-Falmouth (see also Figure 2.1). There are also small areas of potential and current fruitland west of the valley boundary, along the Annapolis Basin and near the mouth of Bear River.

The centre of the valley, which is more prone to frost, is mainly underlain by unsuitable soils, except around Berwick where almost 10% of Annapolis orchard area is located on highly favourable sand and gravel loams. Areas even marginally suitable for production of tender fruit are limited to along the Minas Basin south to Windsor-Falmouth and along the Annapolis River west of Bridgetown.

A causeway built at Annapolis Royal in 1964 has apparently reduced the flow of warming tidal waters restricting the area of tender-fruit production in the Annapolis Basin. A new tidal dam in the causeway is thought likely to restore some of this capability (Craig, 1982).

3.2 Orchard Use of Fruitland: Present Status and Trends

3.2.1 Current Orchard Location

The areas of orchard expansion from 1954 to 1977 and current (1977) concentration, as documented by Kinsman (1979), are detailed in Figures 3.2 and 3.3. Each area is described and coded in Table 3.3. The largest areas of production are along the slopes of North and South mountains within Kings County, most notably on the north slopes (zones 1a, b, c, and 2), near Berwick and Morristown (3 and 4), and around Minas Basin (5 to 9). There are only three small, scattered concentrations in Annapolis County (10 to 12), and two in Hants,

TABLE 3.3

Trends in the Location of Orchard Area, Annapolis Valley, 1954 to 1977

Map Code	Location/Description	Change 1954 to 1977
	Kings County:	
1a, b, c	Along the slopes of North Mountain from Selfridge Corner to Kinsman's Meadow on Pelton and Woodville soil series.	Large concentration--three nodes of expansion.
2	Near Upper Canard on Somerset sandy loams.	Expansion.
3	Slopes of South Mountain, near Morristown-Rockland-South Berwick on Berwick sandy loams and Morristown loams.	Expansion.
4	Berwick area on Berwick sandy loams, despite the higher frost risks on the valley floor.	Expansion.
5	Wolfville Ridge, along the Gaspereau Valley.	Small areas of expansion in eastern and western nodes only; decline in centre.
6	Southeast of Kentville.	
7	On slope of North Mountain, near Lower Blomidon.	Decline.
8	On slope of South Mountain, south of Wolfville.	Two small nodes of expansion, near Grand Pre and south of New Minas.
9	Along the Avon River near Grand Pre.	
	Annapolis County:	
10	On the slope of North Mountain near Melvern Square, immediately adjacent to Kings County.	Expansion.
11	Near Middleton.	Decline.
12	East of Bridgetown, near Centrelea.	Decline.
13	Along north and south banks of the Annapolis River, near Annapolis Royal.	A new area.
	Hants County:	
14	South of Windsor.	Expansion in central node only.
15	Falmouth-Mount Denson area.	Greatest decline of any area in valley.

SOURCES: Figures 3.2 and 3.3.

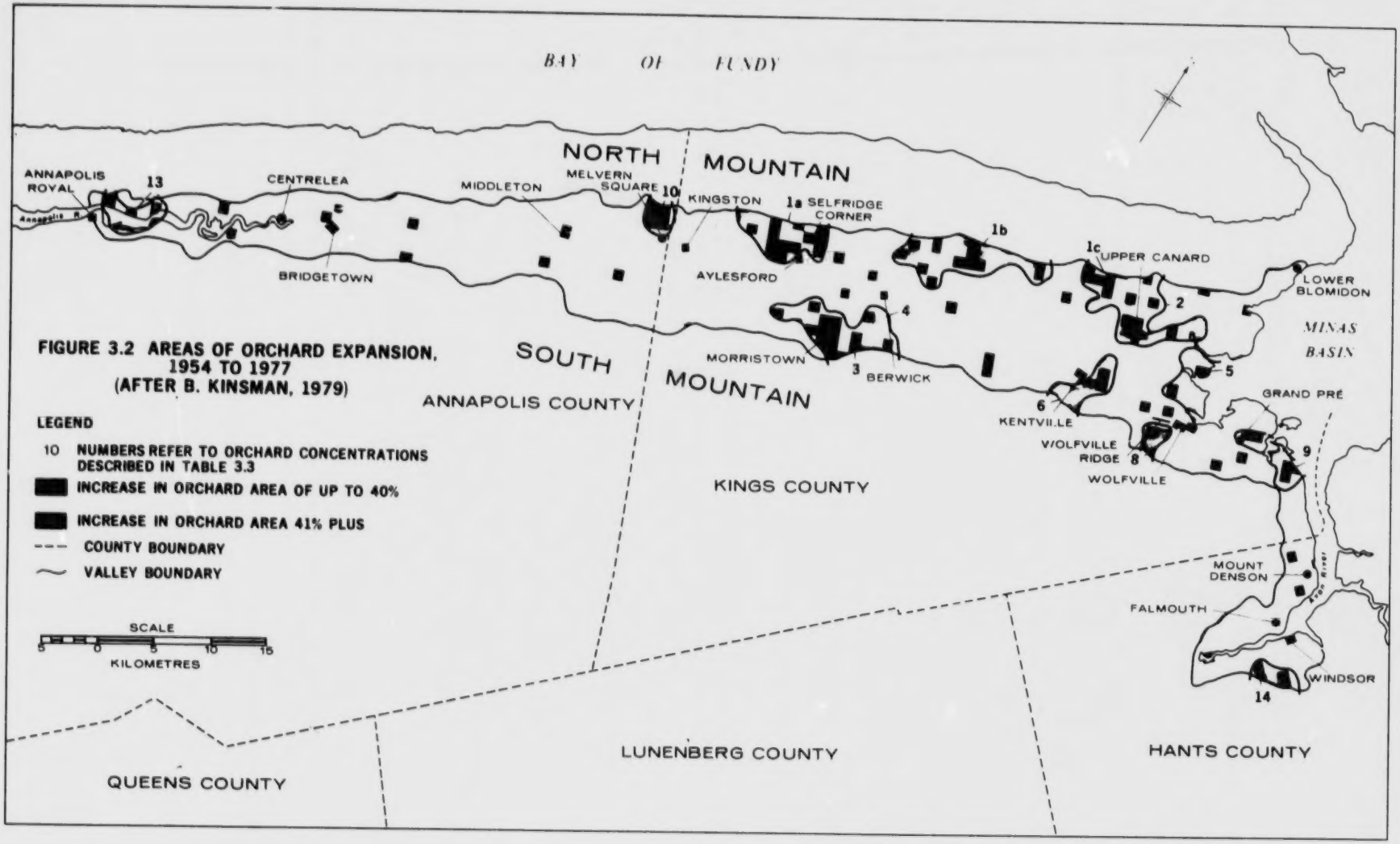

FIGURE 3.2 AREAS OF ORCHARD EXPANSION, 1954 TO 1977 (AFTER B. KINSMAN, 1979)

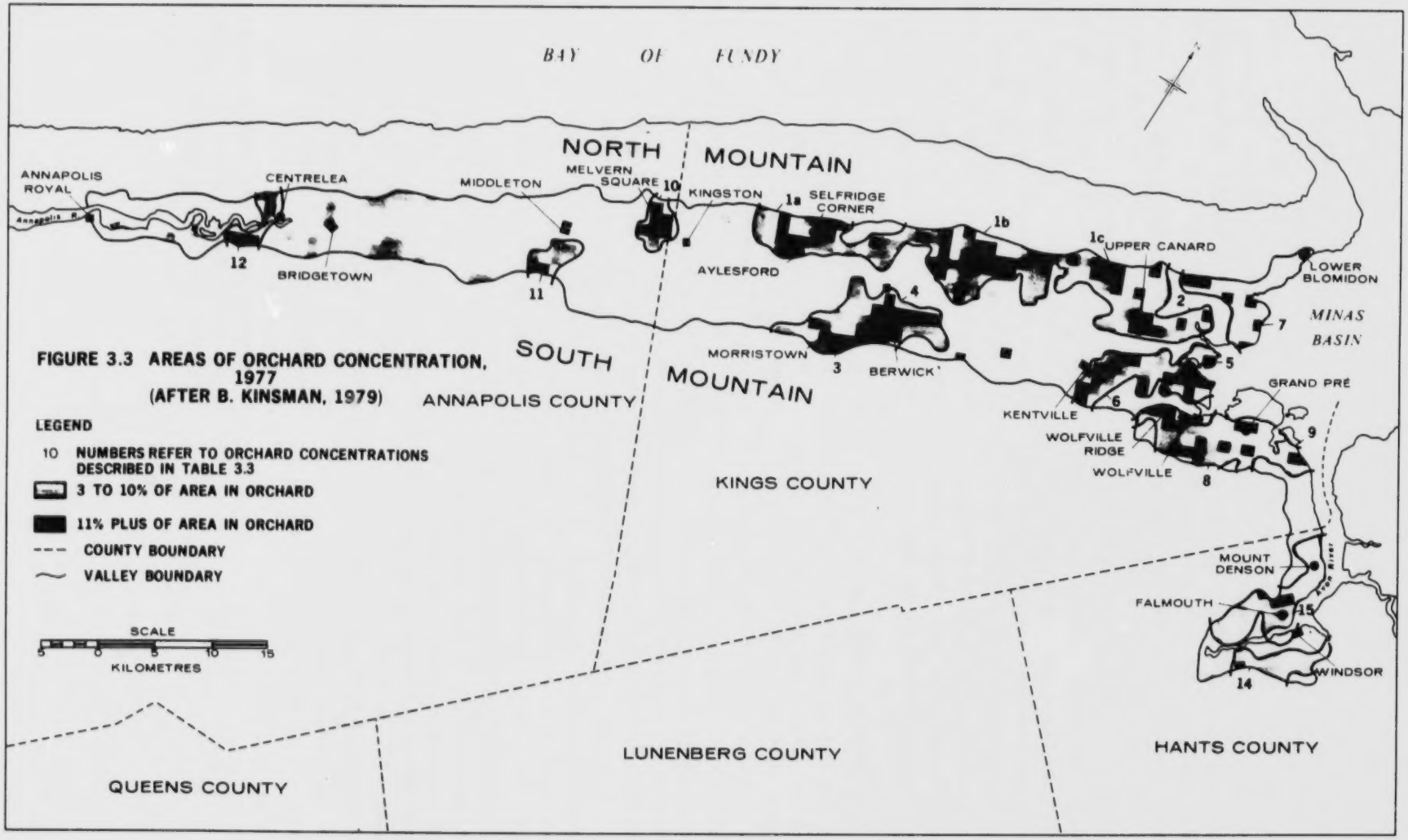

FIGURE 3.3 AREAS OF ORCHARD CONCENTRATION, 1977 (AFTER B. KINSMAN, 1979)

around Windsor-Falmouth (14 and 15).

Apple, sour cherry, and pear plantings are mainly to be found on the slopes of the North and South mountains and at both ends of the valley. Pear production is marginal, being hampered by the cool middle season. Tender fruits, such as peaches, are mostly grown in the warmer areas along the shores of Minas Basin, from Canning to Falmouth, and in a less extensive area along the Annapolis Basin east to Bridgetown. Peaches remain a marginal crop because of harsh winter temperatures, cool summers, and the relatively short growing season. Generally, only one year in five will produce a good peach crop (Craig, 1980).

Only about 7% of all suitable soils in the valley were in fruit production in 1978 (see Table 3.2). Allowing for those suitable soils located in the climatically-inappropriate valley centre (about 10 to 15%) and within ownership parcels or physical areas too small for modern production requirements, an expansion of up to six times the current area is physically possible (Crowe, 1980a). About 57% of the current (1978) orchard area (2,540 hectares) is located on soils highly favourable for fruit production and 31% (1,270 hectares) is on favourable soils. The remaining 13% or 522 hectares of orchard area is located on marginal or unsuitable soils. Substantial areas of highly favourable (24,000 hectares) and favourable soils (21,000 hectares) for fruit production nevertheless remain unutilized in the valley; lack of markets and land-use competition have prevented its use for fruit production.

3.2.2 Trends in Orchard Location

Since World War II, both the area in orchard and the proportion of trees in the valley have become more concentrated in eastern Kings County, especially along the slope of North Mountain (Figure 3.2 and Table 3.3). In the period from 1939 to 1981, the proportion of the valley's orchard area in Kings County increased from 75% to 88%, while falling by half or more in both Annapolis and Hants (Table 3.4). The percentage of the valley's trees in Kings also increased by 19% from 1939 to 1981, while in Annapolis and Hants counties these proportions fell by 67% and 43% respectively (Collins, 1941; Statistics Canada and Nova Scotia Department of Agriculture and Marketing, 1981). Of new trees planted in the valley under the Tree Fruit Incentive (1976-1981), 90% were in Kings, adding to its already 88% proportion of trees in 1973. The proportion of trees in Hants (8%) exceeded that in Annapolis County where there is twice as much area; this suggests that Hants growers may have turned finally to the greater densities of the growth-controlling rootstocks. Major density differences between the counties arose with the earlier and more complete reactions of Kings and Annapolis growers to overproduction in the 1940s and 1950s and the advantages of the newer rootstocks in the 1960s and early 1970s.

To document long-term trends in the concentration of orchards, Kinsman (1979) has plotted the changes in orchard area for the period from 1954 to 1977 (see Figure 3.2). These data do not include most of the plantings under the recent Tree Fruit Incentive. Data on total land-use change in the valley for the period from 1961 to 1981 are currently being gathered by the Lands

TABLE 3.4

Area and Distribution of Tree Fruit, Annapolis Valley, 1871 to 1981[a]

Year	Total Area (hectares)	% Change in Area	Percentage of Orchard Area in:		Percentage Distribution, by County		
			Nova Scotia (%)	Canada (%)	Kings	Annapolis	Hants
1871	2,534	-	46%	ND	ND	ND	ND
1881	4,236	+67%	48%	ND	ND	ND	ND
1939	12,290	+190%	ND	ND	75%	18%	8%
1949	9,857	-20%	ND	ND	81%	12%	7%
1951	8,045	NA	94%	11%	78%	15%	7%
1956	6,711	-32%	96%	10%	78%	14%	8%
1961	5,165	-23%	97%	9%	79%	11%	8%
1966	5,353	+4%	98%	9%	84%	10%	7%
1971	4,905	-8%	98%	9%	85%	9%	6%
1976	4,894	0%	96%	9%	83%	9%	8%
1981	4,703	-4%	97%	10%	88%	8%	4%
Change (%), 1939-1981	NA	-62%	-	-	+17%	-46%	-50%

NOTES: NA--Not applicable.
ND--No data.
[a] Data for 1951 to 1976 use the following definition of census farm--0.4+ ha with $50 sales of agricultural products for 1951 to 1976; 1981 data use new definition--$250+ sales.

SOURCES: 1871, 1881--Morse (1952); 1939--Collins (1941); 1949--Nova Scotia Department of Agriculture and Marketing (1950); 1951 to 1976--Statistics Canada (1973; 1978b); 1981--Statistics Canada, 1982c.

Directorate (Atlantic Region), Environment Canada; these data will allow more precise estimates of all land-use changes. It is expected that the data will be available for use in late 1983; they will be incorporated into the analysis in the final national overview report. These will also constitute base-line data which will aid in evaluation of future land-use changes in the valley.

The greatest increases in orchard area, according to Kinsman's (1979) data, took place within the large concentrations of orcharding in eastern Kings County--areas #1 to 6, 8, and 9 in Figure 3.2. In Annapolis County, only an area near Malvern Square (#10) experienced growth; a small new concentration could be developing east of Annapolis Royal (#13), though this is perhaps simply concentration of the existing orchards in the area. A compact node south of Windsor (#14) was the only area of expansion of orcharding in Hants in this period.

The many small, dispersed (and often unkempt) farmstead orchards generally have been withdrawn from production (Kinsman, 1979). These have usually been located in areas of poor or marginal soils or climate for fruit growing. This phenomenon of declining orchard area, illustrated by the large blank sections and by the disappearance of a number of areas in Figure 3.3 (#7, 11, 12, and 15), suggests that the data in Table 3.4 are only indicative of net changes. A much greater total adjustment has taken place over this period, since much of the current fruitland, about 4,700 hectares in 1981, was probably not even in production in 1939.

Orchard production is being concentrated into a relatively small number of areas which generally possess superior soil and climatic resources, since present growth-controlling rootstocks frequently require better soils than standard rootstocks. It appears that this consolidation of orchard areas has been influenced primarily by proximity to infrastructure--horticultural research (Kentville Station), processing (in eastern Kings County), transport, and services. The development and maintenance of the fruit-processing industry largely in eastern Kings County is therefore both a partial cause and result of a strong production base there (Ryle and Gervason, 1980). This concentration of production in Kings was in turn encouraged by federal assistance to both growers and processors during and after World War II (see Section 5.1). Horticultural expertise at the federal research station at Kentville contributed to this concentration, as well as several federal and joint federal-provincial programs, such as the tree-pulling bonuses and the Tree Fruit Incentive (see following section), which accelerated concentration by encouraging adjustment in orchard holdings. Improved sales and record prices in the late 1970s have further accelerated the process of concentration already underway.

3.2.3 Trends in Orchard Area

The area in fruit production in the valley has varied with fluctuations in the industry. Although historical data are incomplete (Table 3.4), it is clear that the maximum extent of the fruit-growing area in the valley occurred around 1911. By 1939, the number of trees had already declined by about one-quarter (Table 3.5). In response to various marketing problems, more intense tree-fruit culture, and productivity increases, the area in orchard in

TABLE 3.5

Trends in Number of Fruit Trees, Annapolis Valley, 1921 to 1981

Year[a]	Total Tree Fruit (000's)	Apple Trees Only (000's)	% Change in Apple Trees	
			Over Period	Per Annum
1921	ND	1,660	NA	NA
1931	ND	1,827	+10%	+1.0%
1939	1,643	1,588	NA	NA
1949	1,233	1,123	-29%	-2.9%
1954	ND	727	-35%	-7.1%
1959	ND	583	-20%	-4.0%
1964	ND	560	-4%	-0.8%
1973	622	561	+0%	+0.0%
1977	780[e]	703	+25%	+6.3%
1981	925[e]	839	+19%	+4.8%

NOTES: ND--No data.
NA--Not applicate.
[a] Census data are too inconsistent after 1931 to be used at this level.
[e] Estimated by author.

SOURCES: 1921--Dominion Bureau of Statistics (1963a); 1931--Statistics Canada (1973); 1939--Collins (1941); 1949--Nova Scotia Department of Agriculture and Marketing (1950); 1954--Crowe and Ricketson (1955); 1959--Crowe and Horsburgh (1959); 1964, 1973--Redmond and Embree (1965, 1974); 1977--Embree (1978); 1981--Statistics Canada and Nova Scotia Department of Agriculture and Marketing (1981).

the valley had declined a further 7,000 hectares or almost 60% by 1961, when it amounted to only about 5,150 hectares. This trend appeared in most fruit-growing regions after World War II, but in Nova Scotia it can also be attributed to the considerable agricultural development on poor quality land in the 19th century (Crickmer, 1978). From 1961 to 1981, this decrease continued, but was much less rapid--23 hectares per annum as opposed to 325 hectares per annum in the period from 1939 to 1961. By 1981, orchards occupied only about 4,700 hectares, a decline of 9% since 1961. It appears that even the considerable planting of the late 1970s (see tables 3.5; A.1)[1] has been virtually completely offset by increased orchard densities (see 4.3.3).[2]

Tree-Pulling Bonuses--The substantial withdrawal of area under orchards in the 1940s and 1950s, while primarily the result of marketing problems, was assisted and encouraged by tree-pulling bonuses from the federal government (Morse, 1952). These bonuses were provided through a series of agreements between the Nova Scotia Fruit Growers Association and the federal government, called the "Ottawa Contracts," over the period from 1942 to 1950 (see tables A.2 and A.3). Deficiency bonuses in the agreements often offered protection only if production was below a specified level. Provincial land-breaking assistance also encouraged the withdrawal of orchards in the 1940s (Crowe, 1982). Over 800,000 trees were removed under the federal bonuses at a cost of over two million dollars. In the 1950s, about half as many trees were removed without government assistance (see tables 3.5 and A.1). The federal government subsidized approximately 60% of the 1,350,000 trees removed from 1939 to 1959. If a similar proportion of the land withdrawn from orcharding in this period is directly attributable to the pulling bonuses, then approximately 4,250 hectares, or about 35% of the 1939 land area, would have been removed under them.

The momentum of withdrawal under the bonuses at the end of the 1940s is probably responsible in part for the continuing withdrawal of trees and area in the 1950s. Only an average 13,000 trees a year were planted from 1939 to 1959. Consequently, by 1959 the tree stock had declined to just over 580,000 apple trees and about 60,000 of other fruits, mostly pear and plum.

Apple Maggot Control Board--About 45,000 additional trees were removed from non-commercial orchards during the 1940s by the Apple Maggot Control Board (AMCB). A quasi-independent body, funded by the federal and provincial governments, the AMCB was designed to inspect for and control apple maggot infestation. The Board contributed directly to the removal of about 300 hectares of orchard area which were neglected or abandoned, and it probably encouraged additional growers to destroy further infested areas voluntarily. The AMCB continues to function on a much smaller scale, acting primarily as a deterrent to poor practices on the part of non-commercial growers, though about one-quarter of valley orchards still

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1 Tables prefixed with "A" are in the appendices.

2 This conclusion is not supported by a recent estimate based on the 1981 "Fruit Tree Census" (Statistics Canada and Nova Scotia Department of Agriculture and Marketing, 1981), which suggests an increase of 20% in orchard area since 1973. Perhaps the Land Use Monitoring Program data will solve this problem.

must contend with maggot infestation (see section 4.3.6 below).

Land Improvement Policy--In the five year period 1971-75, the Land Improvement Policy assisted with 50% of the costs of land clearing and improvements under the Agricultural Rehabilitation and Development Act (ARDA II). Cost-shared with the provincial government, the policy was administered by the Nova Scotia Department of Agriculture and Marketing. In Kings County, about 2,000 hectares of higher potential agricultural land were cleared, an addition of approximately 8% to its cropland base (Ryle and Gervason, 1980). Little if any of this additional land, however, has been put into orchard operations or represented clearance of old orchards for other agricultural uses (Dargie, 1982).

Land Clearing and Improvement Project--Fruit growers apparently made little use of the Land Clearing and Improvement Project, 1976-81, of the Canada-Nova Scotia Subsidiary Agreement: Agriculture Development (hereafter called the agricultural sub-agreement). In the Morristown area, some forest clearance for orchards was undertaken. Some land, initially cleared for other purposes may eventually be planted with fruit trees, while some older orchards may have been cleared for vegetable production under the agreement. These amounts are not thought to be very great.

Tree Fruit Incentive--Tree planting was encouraged under the Horticulture Program, also part of the recent agricultural sub-agreement. An 80% federally-financed subsidy of $2 per tree, for a maximum area of 10.1 hectares over the term of the agreement, was provided to commercial growers (those with operations of 2.1 hectares or more). For each additional 10.0 hectares of established orchard, another hectare was also eligible for subsidy. This subsidy replaced similar provincial support of $1 per tree in effect from 1973 to 1975. By 1981, the incentive had exceeded its total target for plantings by about one-quarter. (The program was extended to 1981 pending negotiation of the next sub-agreement.) Approximately 310,000 fruit trees were planted in the valley under the agreement from 1976 to 1981, a rate of 52,000 per annum (see Table A.1). An average of 104 different growers used the incentive each year, planting about 1.6 hectares each in 1981. Between 1973 and 1981, over 400,000 trees were planted in the valley, an increase of almost two-thirds (Table 3.5), while the rate of planting rose during the incentive period by over a quarter from 46,000 per annum in 1976-78 to 59,000 in 1979-81. These rates exceed documented planting rates at any time since 1939 and are 45% greater than those of the early part of the 1970s.

Assuming an average planting density of 285 trees per hectare, almost 1,100 hectares (or about 23% of the 1976 area) were either planted or replanted under the agreement. Yet the area in orchard fell in the 1976 to 1981 period, indicating a substantial increase in tree density. There has clearly been much replanting of the older, less productive orchards, as well as plantings in new areas replacing removed older orchards.

3.3 Encroachment on Fruitland

3.3.1 Urban Demands on the Land Base

Population levels in the valley have been relatively stable, with only 15% growth in Kings County from 1961 to 1976. The expansion of extensive rural settlements, however, has

been substantial; for example, Kings County rural settlements with populations of over 1,000 grew by more than 2.4 times, while its three incorporated towns expanded by only 18% (Dominion Bureau of Statistics, 1962, 1963b; Statistics Canada, 1978c, d). The major urbanizing areas are located between Kentville and Wolfville at New Minas and at Port Williams and around Kentville at Aldershot/North Kentville and Coldbrook (Figure 3.4). New Minas, for example, grew at a rate of 8% per annum through the early 1970s, taking from Kentville the role of main commercial centre of the valley (County of Kings, 1975a, 1979). The demand for rural living, mostly from long-time residents, has resulted in increased rural, non-farm housing with its attendant impact on agricultural land use (Lash, 1982; McRae, 1982).

These urbanizing areas are generally not now in orcharding, though they often have potential for fruit production. Assessment of the importance of the consumption of fruitland by urban/residential development is complicated by considering potential fruitland rather than just that currently under production. Potential fruitland is in abundant supply, is the most suitable land for a wide range of other crops, and is already to a large extent in use for other agricultural activities. The competition among agricultural uses for an increasingly better agricultural land base is affected, directly and indirectly, by urban and rural residential development (Crickmire, 1978; McCuaig and Manning, 1982; McRae, 1982). Potential fruitland consequently warrants some consideration in this report.

3.3.2 Causes

The Pottier Formula--Rural settlement pressures in Nova Scotia have, to a large extent, arisen out of a provincial grant structure dating from the 1950s. The Pottier formula, a funding scheme initially implemented to ensure that the quality of education in rural areas met urban standards, was extended to allocating funds for such municipal services as sewage and water supply. Provincial grants to rural municipalities for these services have been more than four times greater than those to towns--$1.80 per $100 assessment in rural areas as compared to only $0.40 in towns. Services in rural areas of the valley can often therefore be maintained at levels comparable to urban areas, in spite of lower tax levies. The towns are thus at a distinct disadvantage in attracting growth. A 1981 replacement formula for provincial funding (based on population density) is now providing less money to rural municipalities, though the towns still must tax at comparatively higher levels (Elliot, 1982). Under a special provision in this formula, the predominantly rural Municipality of Kings County is guaranteed a stable income based on 1979 dollars (Elliot, 1982).

Canada Mortgage and Housing Corporation (CMHC)--Various municipal programs available through the CMHC between 1961 and 1980 provided funds for the establishment or expansion of infrastructure services, including sanitary sewer systems (trunk-collector lines and treatment and disposal facilities), storm trunk sewers, and water supply systems, as well as the planning required for them.

The programs were administered through the

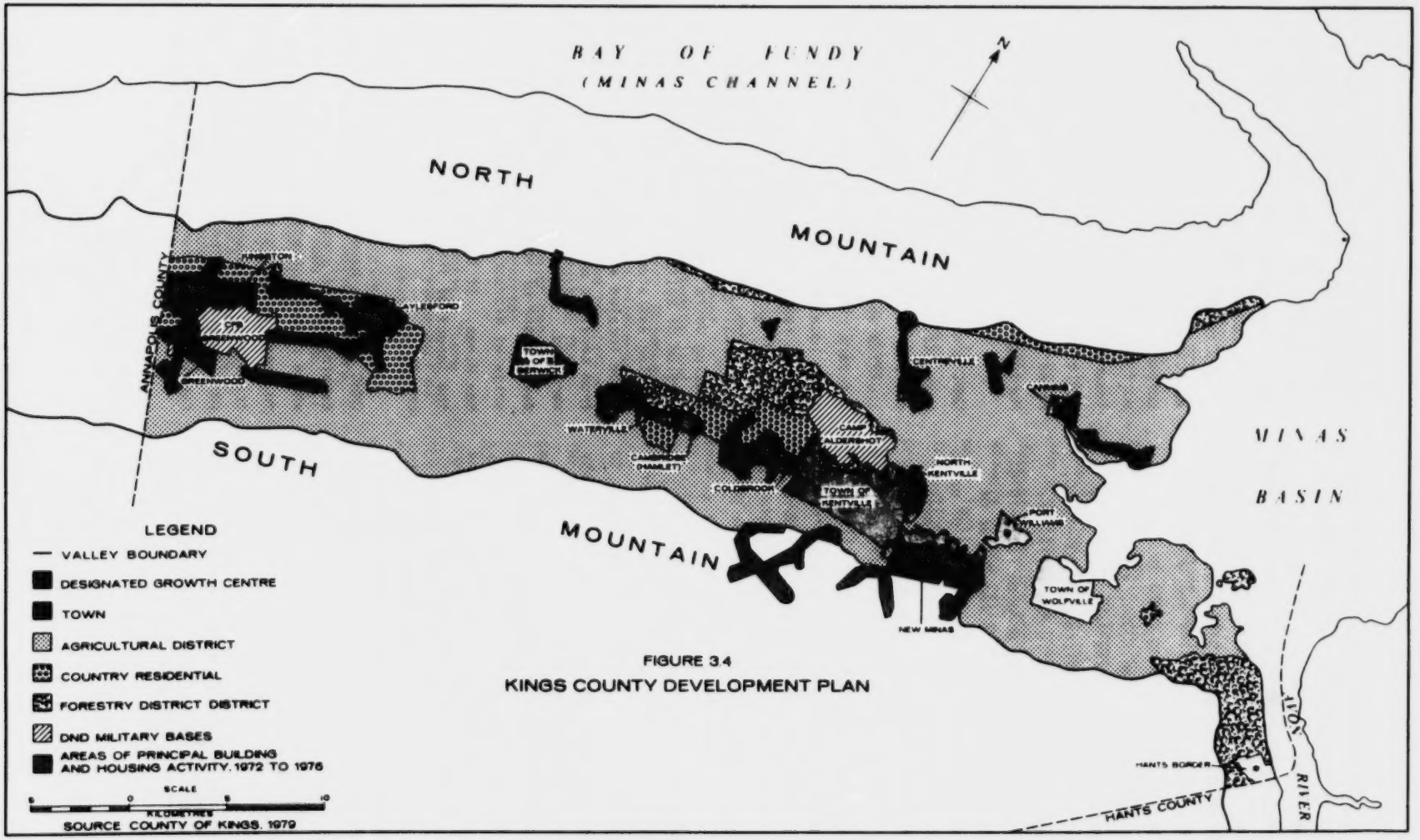


FIGURE 3.4
KINGS COUNTY DEVELOPMENT PLAN

provincial government, which also contributed to many of the projects. In many instances, the result was that for each dollar's worth of infrastructure, a municipality would pay, for example, 22 cents. The CMHC formula for small community assistance in 1975-1978, when most of the funding in the valley was granted, provided 50% of qualifying costs to communities of less than 1,000, with progressively larger towns (e.g., 10% for communities with populations of 4,000-5,000, although all communities in the valley are smaller than 4,000). The program (1975-1978) also included loans of up to two-thirds of eligible costs, with loan forgiveness of up to 25% of the principal and interest. Grants were also available for projects not financed by the CMHC and for excess per-capita costs in areas of dispersed population or difficult soil conditions. The programs therefore would tend to encourage urban/residential growth mainly in the smaller communities and dispersed rural areas of the valley.

In Kings County, however, the opposite has occurred. With adoption of the growth centre concept in 1973, the County used CMHC funds to service only these designated centres, thereby promoting planning, more compact development, and the preservation of agricultural lands (Elliot, 1982; see Figure 3.4). Most of the required infrastructure is now installed; some growth centres in fact have substantial overcapacity. Despite the potential for continuing expansion, there is some concern that growth could be stalled by the withdrawal of the program in 1981. It is not known what effect these funds had in Annapolis and Hants counties.

The CMHC has, in the past, discouraged development of septic lots and unserviced subdivisions by not issuing mortgages. Now, however, if the municipality allows development, CMHC will provide loans for septic-tank lots. Partially because of the growth centre concept, this change is not likely to have significant effect on agricultural land use in Kings County. The corporation must also compete with private mortgage insurers; its share of mortgage insurance in the valley remains low. In addition, a higher-than-normal share of valley house building is self-financed (Canada Mortgage and Housing Corporation, 1980).

CMHC grants under the Public Housing Program have assisted the development of many senior citizen housing units. These units, usually low-rise apartments, reduce demands for rural, off-farm retirement dwellings and are most often located within urban centres (see Elliot, 1982). At Berwick and Wolfville, however, some orchards have been removed for such housing. In addition, co-operative housing units have apparently been constructed outside of Wolfville. The Co-operative Housing Assistance Program requires the site to be located at least five kilometres away from serviced areas if it is not to be serviced. CMHC has also been involved in the development of about 100 private apartment units at Windsor, Kentville, Wolfville, and New Minas. It is not specifically known what the impact of these activities has been on orchards.

CMHC programs have mainly contributed to the development of growth centres in Kings County, where recent concentrated expansion has tended to preserve agricultural land (i.e. potential fruitland) in general and orchards in particular. To the greatest extent, local rural-zoning measures and participation in

available programs by municipalities and the province have determined the net effect on land use of CMHC programs.

Federal Land--The most noteworthy parcels of federally-controlled land in the valley are the three military bases, Aldershot Military Camp on the northern boundary of Kentville, CFB Greenwood at the western end of Kings County, south of Kingston, and CFB Cornwallis at the western end of the valley (Table 3.6 and Figure 3.4). Together they occupy over 2,000 hectares of mostly CLI class 4 and poorer agricultural land, none of which is suitable for fruit production. Increasing tobacco and alfalfa cultivation in the valley, however, may mean that the land could become more attractive for commercial agriculture (Ryle and Gervason, 1980).

The Aldershot facility is little used, though federal ownership of this block has probably preserved it from suburban development, deflecting this development onto nearby land of better agricultural capability. Greenwood, on the other hand, is an active airforce base with a total military and civilian population of over 7,000. Largely as a result of the base, Kingston-Greenwood is a major regional sub-centre of both nodal and dispersed development, second only to Kentville-Wolfville in Kings County. There has been some sprawl development south-east of the base. Hobby farms owned by base personnel and Armed Forces retirees also extend into nearby fruitland areas (e.g., Malvern Square, #10 in Figure 3.3), although some of these farms are good commercial operations. Nevertheless, there is now little direct pressure on orchard land, since the base is a considerable distance away from the major concentrations of fruit-growing in eastern Kings County (see Figure 3.2).

Future expansion of any of the bases, particularly the Cornwallis facility, would increase pressure on surrounding fruitlands through off-base housing.

Highway 101--This limited-access highway linking Halifax to Yarmouth is currently under construction through the centre of the valley. The progress of the route has been much delayed by controversy over its potential effects on the valley's farming base. The major implications for land use are the truncation of some 24 of the valley's most productive farms, the disturbance of drainage patterns, and the potential for sprawl development around interchanges (Kimber, 1980). Since the route is mostly through the valley centre, little fruitland or potential fruitland is affected. While some federal funding was involved, routing decisions were made by the provincial government.

3.3.3 Response: The Kings County Development Plan and Other Measures

Through the 1970s, concern was expressed, particularly from the agricultural sector (i.e., Kings County Federation of Agriculture), about the long-term effects of population growth in certain rural areas of the county (County of Kings, 1979). In 1979, a Municipal Development Plan for Kings County, a local initiative, was approved by the Minister of Municipal Affairs. The Plan, implemented by a zoning bylaw, provides guidelines for future development of the rural land resource by designating 11 growth centres and 16 hamlets in the valley, in which 80 to 90% of future growth is to be accommodated (Figure 3.4). Strengthened business districts

TABLE 3.6

Significant Federal Land Holdings in the Annapolis Valley

Department/Holding	Area (hectares) Holding	Total
National Defence		
Canadian Forces Base Greenwood (Kingston) (including easements, and remote sites)	1,091	
Aldershot Military Camp (Kentville)	1,021	
Canadian Forces Base Deepbrook (Cornwallis)	240	
Granville Ferry Rifle Range and Training Area	1,370	
		3,659
Agriculture Canada		
Kentville Research Station	188	
- Leased site, one-half mile west of Canning	3	
- Field station, Sheffield	77	
		268
Environment Canada		
Grand Pre National Historical Park (Grand Pre)	11	
New England Planters National Historic Site	6	
Fort Anne National Historic Park (Annapolis Royal)	13	
		30
		3,957

SOURCE: Central Real Property Inventory, Department of Public Works, 1981.

are to be encouraged and urban development boundaries have been delimited for these growth centres. Only a small portion of growth is to be taken up by the hamlets, which are to retain their rural character. Development permits are not to be issued for non-farm development (including non-farm residences) on class 2 or 3 agricultural land, unless the land was subdivided prior to March, 1978. New housing in rural areas is to be substantially reduced and concentrated in "country residential districts," which have low-to-medium agricultural capability and are mostly located outside of the valley. Residential development on agricultural holdings is to be limited to one severance lot per year. (Limited as it is, this is the only severance limitation in place in rural Nova Scotia in aid of preservation of farmland.)

Most of the remainder of the valley is classed agricultural--generally at least 60% in current agricultural production or rated CLI agricultural capability class 2 or 3. The two military bases in the county are exempt from classification. Within the agricultural districts (illustrated in Figure 3.4), agriculture and related uses are to have priority over other uses, which are not generally to be permitted. Exceptions can be made at the discretion of the development officer only on boundaries between CLI class 3 and 4 soils.

That the number of designated growth centres was reduced from an earlier plan, with the active support of the Federation of Agriculture, indicates the level of acceptance for the measure in the agricultural community. Public realization of the importance of preserving the agricultural land base has been fundamental to the success of the Plan and is an important factor in its future effectiveness.

While the Plan appears to be effective in Kings County, the characteristic sprawl development associated with CFB Greenwood has now merely shifted to rural areas on the western side of the boundary with Annapolis County, where no planning or development mechanisms are yet in place. Most of the new rural lots and settlement in Annapolis County have been located there since the Kings plan was implemented (Lash, 1982). The nearby orchard concentration at Melvern Square (#10, Figure 3.3) has not yet been affected. With full staffing of the Michelin Tire Plant (see Section 3.3.4 below) and the approval of development plans for the towns of Annapolis County, there could be further pressures on these agricultural and orchard areas.

Soils Mapping--Adjustments to agricultural district boundaries can be made through amendments to the Kings County Development Plan. These boundaries are to be refined by upgrading the CLI soils data on which they are based. The CLI data are, at best, accurate to the 1:50,000 scale; they are not applicable at the farm level. In addition, the accuracy of agricultural capability data in currently forested areas is questionable. To redress these problems, Kings County has sponsored soil testing by Agriculture Canada's Land Resource Research Institute, funded under the recent agricultural sub-agreement. Approximately 20,000 hectares have been surveyed. Until the county can implement new boundaries, the use of CLI boundaries for agricultural districts has been upheld by the denial of an appeal to the Nova Scotia Planning Appeal Board in February, 1981 (Boyd, 1982).

Land Registration and Information Service (LRIS)--An initiative to create a modern, computerized system of property registration throughout the Maritimes was begun in 1973. The system is administered through the Council of Maritime Premiers, with funding of over $28 million (75% federal) supporting the first six years of the project. In 1979, the federal government withdrew its support, but the provinces are continuing with the program. Completion of property mapping by LRIS will consequently be delayed by five to six years for the valley, longer for other areas of Nova Scotia (Simpson, 1982). A fully-operational system with indexing of land parcels will take at least until 1990, postponing some of the potential benefits of the implementation of rural planning and zoning in the valley.

Change-of-Use Tax--In 1978, the Province implemented a change-of-use tax to discourage conversion of agricultural land to non-resource uses. Any new non-agricultural use is taxed 20% of the value of the land for that use. Kings County Council has requested that the change-of-use tax and the farm-tax exemption be eliminated in designated growth centres (Boyd, 1982). These measures could strengthen municipal efforts to concentrate new growth and discourage consumption of high capability agricultural land, at least in Kings County. The level of the tax may be too low, however, to act as a deterrent elsewhere in the valley (Lash, 1982).

3.3.4 Prospect

Rural development in Kings County since 1979 has tended to occur in the designated areas and pressures on farmers to sell agricultural land for development have been reduced (Parker, 1980). The single greatest challenge to the Plan will be associated with the new Michelin Tire Plant at Waterville-Cambridge (see Figure 3.4), the construction of which has been assisted by federal and provincial funding. A $42 million grant was provided by DREE for the new facility and two existing plants at Bridgewater and Granton. Location of this major industrial tire-production plant in Nova Scotia is the result of the company's efforts to find a non-unionized labour force close to markets. The location of the plant apparently could not be influenced, since Michelin would build in the province only if permitted to use the Waterville-Cambridge site.

Employment at the plant is expected to rise from 300 to 500 in 1982, reaching 1,500 by about 1987 (Elliot, 1982). Based on current surplus levels of water and sewage infrastructure capacity, the expected housing needs for those directly employed at the plant can probably be easily accommodated in the Kentville-Wolfville corridor. The plant itself is to be located within the urban boundary of Cambridge, outside of the agricultural district. However, the housing needs of a large number of workers and their families, as well as the expected multiplier effect from this influx, may place some pressures on the Kings County Development Plan (which was developed with expectations of lower growth), as well as on rural areas of eastern Annapolis County. A simulation model developed for planning by the provincial and municipal governments cannot be used, due to the lack of necessary information on the phasing of employment provided by Michelin officials. No impacts on fruitland were apparent in the construction phase.

3.4 Federal Land-Use Impact: Demand for Fruitland

Federal actions appear to have had substantial effects on the use of fruitland in the Annapolis Valley. Those actions with direct impacts on total orchard area and orchard location are summarized later in Table 6.1. According to this analysis, the most significant federal actions are: the tree-pulling bonuses of the 1940s, the Apple Maggot Contaggot Control Board, the recent Tree Fruit (planting) incentive, and, potentially, funding of the new Michelin Tire Plant.

The tree-pulling bonuses directly financed about 60% of the substantial withdrawal of orchard area in the 1940s and 1950s. The estimated 4,250 hectares of withdrawn orchard amount to about 90% of the present orchard area. Provincial land-breaking assistance also contributed to the effect of this federal subsidy on land use. In the same period, the Apple Maggot Control Board, an autonomous body jointly funded by the two governments, was active in seeking to eliminate many poorly maintained orchards which threatened neighbouring commercial stands. Its on-going objective has been to control this pest and safeguard commercial orchards. The Tree Fruit Incentive of the late 1970s, again a joint program, encouraged the planting or replanting of about 1,100 hectares of orchards in a period of strong markets. This activity generally has taken place on a better land base closer to infrastructure. The federal government, with provincial involvement and direction, has not only promoted adjustment of orchard area to match current markets, but also has accelerated the trend to increased density and the use of a more optimal quality land base in close proximity to infrastructure.

The Michelin Tire Plant represents a case in which a federally-assisted facility may cause future problems. The plant and its spin-off development could test the ability of Kings County and the other rural municipalities to preserve the valley's agricultural land base. Lack of work force and employment phasing data is hindering provincial and municipal efforts to plan for future contingencies. Consequently, the new plant's potential effects on fruitland remain unknown.

4.0 PRODUCTION ECONOMICS

In this chapter, the relationship of farm technology and economics to the use of fruitland is examined. The chapter begins with a description of present fruit production in the Annapolis (Section 4.1). The various inputs to orchards--land (4.2), management (4.3), labour (4.4), and capital (4.5)--and the returns to growers (4.6) are then examined. An overall assessment of the nature of federal activities which affect fruitland use through farm production economics concludes the chapter (4.7).

4.1 Annapolis Orchard Production

Substantial changes in apple production over the last 50 years (see Figure 4.1) partially reflect and are reflected in the industry's evolving use of tree stock, age structure, varieties, etc.. Since the 1966-1971 production decline, which resulted from low prices, sharp increases in freight rates, and the final collapse of the traditional British export market, Annapolis apple production has ranged around 45,000 tonnes. Substantial plantings in the last five years, based on recent strong world prices, are expected to boost output significantly in the near future. The potential production level for an average year is now about 50,000 tonnes, but the aim of the Nova Scotia Fruit Growers Association is to increase production by about 50% to 75,000 tonnes (Nova Scotia Department of Agriculture and Marketing, 1980b).

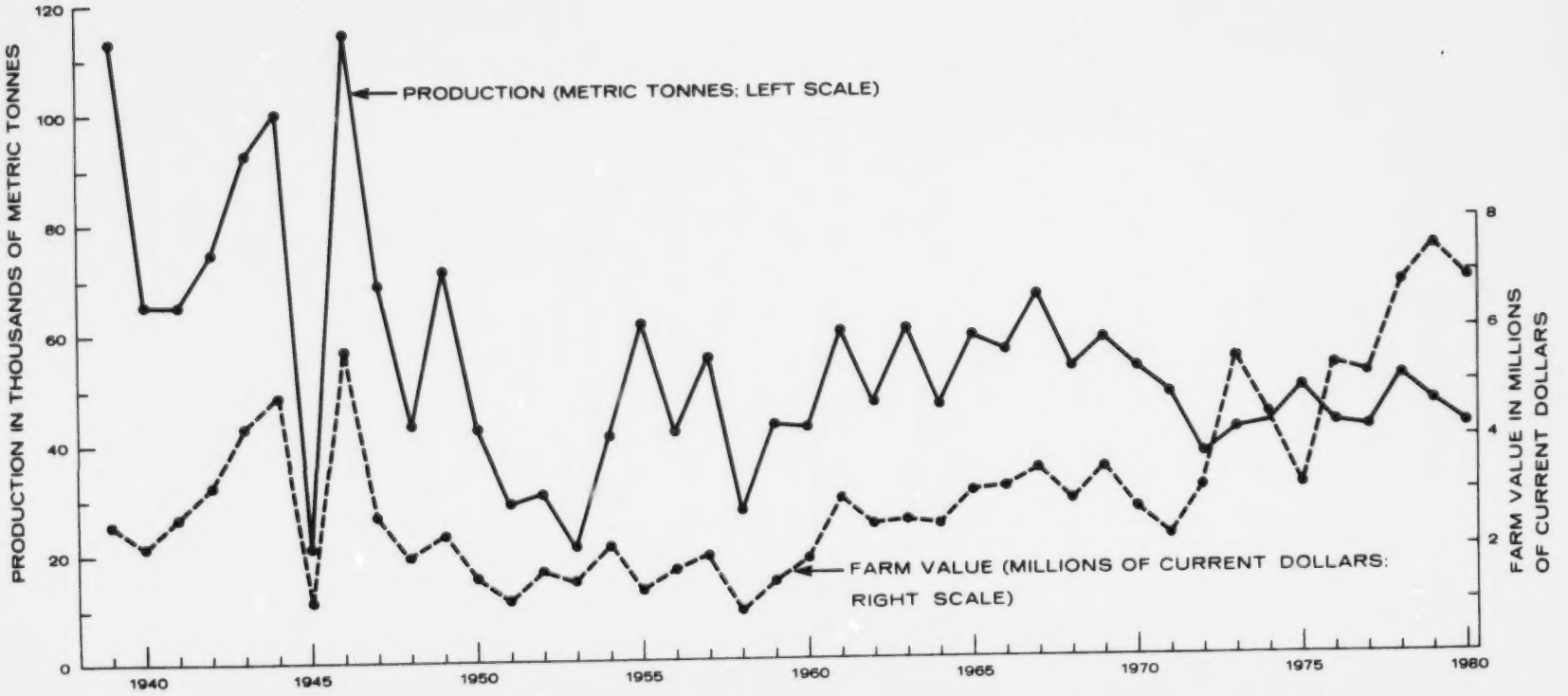
Production of pears and plums in the valley is more limited. Pear production is currently about 1,600 tonnes (Table A.4). With the exception of short periods of lower production in the late 1940s and the late 1950s, it has risen steadily since World War II, almost tripling from 575 tonnes. Farm prices for pears have risen substantially in the last decade. The production of plums, on the other hand, had declined by 1971-1975 to 115 tonnes, about one-third of the levels of the early 1950s. With 1976-1980 output at 220 tonnes, plum production is beginning to return to earlier levels.

4.2 The Land Input--Orchard Size

Land has become an increasingly important component in viable orchard operations in the valley. Unlike other fruit-growing areas of Canada, the per-unit value of Annapolis orchards remains at or near the cost of clearing and preparing it, that is $1,200 to $2,500 per hectare. The mean area of an orchard unit in the valley doubled between 1939 and 1981 from 4.9 to 9.9 hectares (Table 4.1), increasing by 24% between 1971 and 1981 alone. A corollary of increasing unit size in a decreasing total area is the declining number of growers; their numbers have decreased by over 80% since 1939. These changes mostly reflect the increase in larger-size operations, the result of a higher proportion of commercial operations in the Annapolis industry.

The average Kings County orchard size in 1981 was two to three times that of the other counties and had increased by 42% since 1966 (Table 4.2). Kings' orchards are on average closer to what is considered a viable size, at least 10 or 12 hectares. The smaller orchards

FIGURE 4.1
PRODUCTION AND FARM VALUE
OF NOVA SCOTIA APPLES
1939 TO 1980



SOURCES: Nova Scotia Department of Agriculture and Marketing, (1976, 1981).

TABLE 4.1

Changes in Average Orchard Size, Annapolis Valley, 1939 to 1981

Year	Orchard Unit Area (hectares)	% Change
1939	4.9	--
1949	4.9	0%
1961	3.9	NA
1966	5.8	+49%
1971	8.0	+38%
1976	9.8	+23%
1981	9.9	+1%

NOTES: NA--Not applicable due to differences between the census and earlier data sources.
[a] Data for 1961 to 1976 use definition of a census farm as an agricultural holding of 0.4+ ha with $50 sales of agricultural products; 1981 data use new definition--$250+ sales.

SOURCES: 1939--Collins, (1941); 1949--Nova Scotia Department of Agriculture and Marketing (1950); 1961, 1966--Dominion Bureau of Statistics, 1968a; 1971, 1976--Statistics Canada, 1978b; 1981--Statistics Canada, 1982c.

TABLE 4.2

Changes in Average Orchard Size, by County, 1966 to 1981[a]

County	Orchard Unit Area, Census Farm (hectares) 1966	1971	1976	1981	% Change 1966 to 1981
Annapolis	2.8	3.8	4.7	5.7	+104%
Hants	3.0	3.5	6.2[b]	4.0	+33%
Kings	8.5	10.0	11.9	12.1	+42%
Total	5.8	8.0	9.8	9.9	+71%

NOTES: [a] Data for 1966 to 1976 use definition of a census farm--0.4+ ha with $50 sales of agricultural products; 1981 data use new definition--$250+ sales.
[b] 1976 datum for Hants represent an anomaly, which the author cannot as yet explain.

SOURCES: 1966--Dominion Bureau of Statistics, 1968a; 1971, 1976--Statistics Canada, 1978b; Statistics Canada, 1982c.

of Annapolis and Hants counties nevertheless are increasing in size rapidly--by 104% and 33% respectively between 1966 and 1981. (The recent erratic changes in mean orchard size in Hants are an as yet unexplained phenomenon.)

In 1976, 52% of the orchard area in Nova Scotia was contained on the largest 8% of orchards, those over 29.5 hectares (Statistics Canada, 1978a). While the total area in tree fruit changed little from 1971 to 1976, the area in these larger orchards grew by 34%. Conversely, area of the smaller orchard operations (less than 29.5 hectares) fell by 24%. Kinsman (1979) has noted the disappearance of many small, "unkempt," and dispersed farmstead orchards throughout the valley.

While market conditions and general economics (i.e., the cost-price squeeze, see Manning and McCuaig, 1982) have led to the continuing enlargement of orchards in the post-war period, several federal programs have clearly facilitated and accelerated the process. In addition, the significant role of both federal and provincial agricultural personnel, especially at the Kentville Research Station, must be considered; they have continued to define and encourage modern, economically viable orcharding, as opposed to the generally indifferent operations of the 1950s and earlier (e.g., Crowe, 1957, 1982).

Farm Enlargement and Consolidation Programs--The Farm Enlargement and Consolidation programs of the Agricultural Rehabilitation and Development Act (ARDA--1965-71) sought to support directly the enlargement of agricultural operations in Nova Scotia, although apparently with little effect on orchard operations. The programs empowered the Nova Scotia Farm Loan Board to purchase and lease land to farmers for five years, thereby encouraging farm units of economic size. Loan assistance was offered through the Board and the federal Farm Credit Corporation. At the end of the five years, the lessee was able to renew the lease or purchase the land. A land improvement grant of about $125 per hectare was also available to carry out drainage work, site preparation, etc..

Table 4.3 shows that, at least in Kings County, these programs were of only minor significance in increasing the size of orchard operations. Only about 12% of commercial orchard operations were affected, in contrast to almost half of all commercial farms. In only one case was the effect on an orchard operation considered significant (Ryle and Gervason, 1980). The leasing arrangements were probably considered inappropriate by growers of a semi-permanent crop such as tree fruit.

The most significant federal impact on orchard size has been from the Tree Fruit (planting) incentive (see Section 3.2.2) of the late 1970s, which helped to accelerate the trend to enlargement of orchard units. The increasing technical requirements of operating an orchard have made larger units a necessity for economic viability and have increased the growers' reliance on the technical assistance available from the Kentville Station. In sum, while market and economic factors are the most easily identifiable causes of size adjustment, a number of federal programs, have served to facilitate and encourage orchard enlargement.

4.3 Land Management

Federal programs which have an impact on the intensification of land use or on land

TABLE 4.3

Impact of ARDA Farm Enlargement and Consolidation Programs, Kings County, 1965 to 1971

Farm Type	Total Farms Assisted	% Commercial Farms, Sales Over $25,000, 1971	Number of Farms Affected		
			Little Effect	Some Effect	Significant Effect
Orchard	9	12%[e]	3	5	1
All Other	66	ND	37	13	16
Total	75	45%	40	18	17

NOTES: ND--No data.
[e] Author's estimate of number of commercial farms.

SOURCE: Nova Scotia Farm Loan Board, Kentville, after Ryle and Gervason (1980).

management are discussed in this section. First, land productivity and productivity trends are examined (4.3.1). Then, a number of the components of land management are reviewed:

1) specialization (4.3.2);
2) planting density (4.3.3);
3) varieties (4.3.4);
4) age structure (4.3.5);
5) orchard care (4.3.6).

4.3.1 Productivity

Mean yields from valley apple orchards are now in the range of 13 to 15 tonnes per hectare (see Table 4.4), with well-managed orchard plots producing 30 to 38 tonnes. These average values are comparable to gross yields for Ontario's orchards (13 tonnes per hectare, 1976 to 1980; Ontario Ministry of Agriculture and Food, 1978, 1979, 1980, 1981). Since potential yields are approximately 50 tonnes (Crowe, 1980a), most of the Annapolis orchard area is far from reaching its potential productivity. These levels have have not risen substantially since the mid-1960s. However, yields increased by 52% between 1959 and 1966, probably because of the removal of a large number of older trees, the adjustment to larger mean unit size, and the better orchard managers who remained in the industry.

4.3.2 Specialization

Annapolis orchards are part of mixed-farming operations to a greater extent than in all other fruit-growing regions of Canada, with the possible exception of apple-growing areas of Ontario. In 1976, about 70% of the tree fruit-growing area of Nova Scotia (on farm units with sales of $2,500 or more) took place on operations where the primary commodity was either fruit or vegetables (Statistics Canada, 1978a). Although this is admittedly a rough measure of specialization, it is notable that between 1961 and 1976, there was a 33% increase this value and a corresponding decrease in area on all other farm types, except field crop farms (Dominion Bureau of Statistics, 1963a).

The trend towards increased specialization of fruitland is both a corollary and consequence

TABLE 4.4

Yields of Nova Scotia Apple Orchards, 1937 to 1978

Period	Mean Production for 5 Year Period (000's tonnes)	Bearing Age (hectares)[a]/ % Total Area	Yield (tonnes/hectare)	% Change in Yield
1937-1941	98.8	10,491/88%	9.4	--
1947-1951	51.2	8,073/90%	6.3	-33%
1954-1958	45.7	5,738/95%	8.0	+27%
1959-1963	50.6	4,044/87%[e]	12.5	+56%
1964-1968	56.3	3,806/79%	14.8	+18%
1969-1973	47.8	3,532/78%	13.5	-9%
1974-1978	45.7	3,524/80%	13.0	-4%
Potential (1980)	51.4	3,650[e]/75%[e]	14.1	+8%

NOTES: [a] Bearing area includes apple trees 6+ years old to 1959 and 5+ years thereafter. Apple area is estimated directly from percentage of bearing apple trees for the middle year of the period. Bearing percentage for 1954, 1959 and 1964 were assumed to be 90%. Percentage of total area in apples determined from Table 3.5.

[e] Estimated from Tables 3.4, 3.5, and A.3 and Statistics Canada, 1982a. Bearing area datum for 1980 will not be higher; thus, yield will not be lower.

SOURCES: Production: To 1978--Nova Scotia Department of Agriculture and Marketing (1976, 1980a); 1980--Nov Scotia Department of Agriculture and Marketing (1980b).
Bearing area data estimated from: 1939--Collins (1941); 1949--Nova Scotia Department of Agriculture and Marketing (1950); 1956 to 1976--Statistics Canada (1973, 1978b); Redmond and Embree (1965, 1974); Embree (1978); 1980--Statistics Canada and Nova Scotia Department of Agriculture and Marketing (1981); Statistics Canada (1982a).

of that to larger orchard units. Economics (the cost-price squeeze) and the complexity of the work prompt less-specialized growers to withdraw from fruit production. The same government programs encouraging the enlargement of orchard units therefore also have an impact on the trend towards specialization:

1) the Land Improvement Policy (1971-75);
2) the Land Clearing and Improvement Project (1976-81);
3) the Tree Fruit Incentive (1976-81).

Federal and provincial agriculture personnel are another important source of information and assistance. By helping to promote change, these programs and activities have contributed to more specialized land use on orchard farm units.

4.3.3 Planting Density/Rootstocks

Average planting density is increasing in the valley, but remains low in comparison to most other fruit-growing areas of Canada. In 1973, more than half of the trees and over two-thirds of the orchard area were planted to low densities (see tables 4.5 and 4.6). Less than one-third of the orchard area was planted at medium density or greater. Hants County orchards remained almost entirely in the low-density category, indicating that standard rootstocks and poorly-managed orchards continued to predominate there until at least 1973.

The development and testing of suitable size-controlling rootstocks for the valley are being carried out by the Agriculture Canada staff at the Kentville Research Station (Crowe, 1980a). Researchers have been

TABLE 4.5

Orchard Planting Densities, Annapolis Valley, 1973

	% Orchard Area				% Number of Trees
	Total	Kings	Annapolis	Hants	
Density (trees per hectare):[a]					
Low (to 173)	69%	67%	74%	97%	51%
Medium (174 to 593)	30%	32%	26%	2%	46%
High (594+)	1%	ND	ND	ND	4%
Average number of trees per hectare	155	159	154	89	---

NOTE: ND--No data.
[a] See Table 4.6.

SOURCE: Redmond and Embree (1973).

TABLE 4.6

Tree Density of Orchard Systems

Orchard System	Density (Trees per hectare)	Spacing (metres)	Density
Standard	143	7.6 X 9.1	Low
Semi-standard	240	5.5 X 7.6	Medium
Medium	383	4.3 X 6.1	Medium
Semi-Dwarf	840	2.4 X 4.9	High
Dwarf	1,794	1.5 X 3.7	High

SOURCE: Khera and Crowe (1980).

assessing the economic viability of these rootstocks and have tried to inform growers of their potential for intensifying land use (e.g. Khera and Crowe, 1980). However, more research is required before a final recommendation can be made of the most appropriate rootstocks for higher-density planting systems under valley conditions. Only then can the full benefit in terms of intensified land use be achieved (Crowe, 1982).

The Tree Fruit Incentive encouraged increased planting density and offered greater opportunity to put growth-controlling rootstocks to optimal use. Since assistance was provided on a per tree basis, up to almost $2,500 per hectare, Khera and Crowe (1980) have suggested that it was "... a helpful incentive for risk reduction by shortening the pay-back period and improving the income picture. The benefits are, however, positively related to the tree density...." (p. 85). Recent planting under the incentive has increased the proportion of Annapolis area planted at higher densities, (although land capability and management practices must also be considered in determining the most appropriate planting density). For instance, all 166,000 trees planted under the incentive from 1979 to 1981 were on size-controlling rootstocks. Compared to plantings in the 1965-1970 period, these represented a proportional decline of 100% in standard rootstock use (about 143 trees/hectare) and an increase of more than three times in the use of semi-standard rootstocks, which can be planted about 70% more densely (see Redmond, 1972 and Craig, 1980; Table 4.6).

Federal and provincial agriculture departments currently recommend a planting density of 383 trees per hectare (4.3 by 6.1 metre spacing) for trees on size-controlling, semi-dwarf rootstock, ranging from 60 to 75% of standard tree size or medium to semi-standard size (Atlantic Horticultural Council, 1980). This is viewed as the best system for the Annapolis and eastern Canada, because of its superior adaptability to unfavourable conditions and its net returns. Assuming that farm credit interest rates of 10% are available (see

Section 4.5 below), semi-dwarf varieties can bring returns 50 to 75% greater than those of the standard-density system with only 143 trees per hectare (Khera and Crowe, 1980). Incomplete research on physically appropriate rootstocks, however, is hampering efforts to encourage a planting density approaching 383 trees per hectare. The planting rate of the highest density rootstocks between 1979 and 1981 remained at about 38%, a proportion close to that of a decade before.

4.3.4 Varieties

Since 1939, apple production has changed markedly, from primarily culinary or processing apples to fresh varieties (see tables 4.7 and A.5). (Prior to World War II, culinary apples were grown largely for sale in the British market; after the war these varieties were primarily used for processing--Crowe, 1982.) The proportion of fresh varieties has increased by six times since 1939 and comprises about one-half of all Annapolis apple trees. Dual-purpose varieties have only slightly declined from 1939, although the specific varieties are now quite different (Table A.5). With only about 10% of apples now of processing varieties, a proportionate decrease of 75%, the tremendous magnitude of the adjustments within the industry since 1939 is clearly demonstrated.

The tree-pulling bonuses of the 1940s were used largely to eliminate less-desirable varieties. While planting activity was at a relatively low level in this period, federal bonuses in 1948 and 1949 subsidized grafting of recommended scion varieties onto over 40,000 trees on younger rootstocks (Nova Scotia Department of Agriculture and Marketing, 1950). Federal research into the most suitable varieties for the Annapolis was an invaluable precursor for these changes.

The McIntosh is now the premier variety, with almost 220,000 trees in 1981, or 26.1% of the valley total. Substantial portions of the following varieties were also grown: Cortland (12.0%), Red Delicious (11.6%), Gravenstein (11.3%), and Spy (10.5%) (Table A.5). Of the 180,000 apple plantings under the Tree Fruit Incentive from 1976 to 1979, for example, the largest five varieties accounted for 79% (Nova Scotia Department of Agriculture and Marketing, 1980). The domination of the top five varieties (72% of all apple trees in 1981) represents a significant change from 1949, when the top five comprised only 44% of valley apples. From 1976 to 1980, plantings of Spy and Red Delicious were largely replaced by increases in the Cortland, Gravenstein, and, especially, Idared varieties. The incentive appears to have facilitated these planting trends and therefore accelerated their impact on the Annapolis variety mix.

4.3.5 Age Structure

Levels of pre-bearing trees declined after World War I, corresponding with the historical peak in tree stock. This phenomenon actually occurred in every producing region of Canada, except B.C. (Morse, 1952). The tree stock then aged slowly until World War II. In the 1940s and 1950s, low planting and survival rates were reflected in a shrinking proportion of younger, particularly pre-bearing trees. (While planting survival rates to 10-15 years could have been as low as 50% in the 1940s, recent rates are likely around 90%; Crowe, 1982.) The proportion of trees in the oldest category (41+) did not increase significantly

TABLE 4.7

Changes in Use of Apple Varieties, 1939 to 1981

	Percentage of Total Trees					
	1939	1949	1964	1973	1981	Absolute Change 1973 to 1981
Fresh (F)	8%	18%	40%	48%	48%	+47%
Dual (D)	45%	42%	33%	35%	41%	+72%
Processing (P)	47%	41%	27%	17%	11%	-6%
Largest Variety[a]	12% Stark (D)	11% Wagener (P)	19% McIntosh (F)	25% McIntosh (F)	26% McIntosh (F)	+57% McIntosh (F)
Top Five Varieties	51%	44%	65%	69%	72%	+56%

NOTE: Varieties not designated have been distributed proportionately among the purpose categories, except in the absolute change column.

[a] D--Dual; P--Processing; F--Fresh.

SOURCES: 1939--Collins (1941); 1949--Nova Scotia Department of Agriculture and Marketing (1951); 1964, 1973--Redmond and Embree (1965, 1974); 1981--Statistics Canada and Nova Scotia Department of Agriculture and Marketing (1981); Purpose categories--after Embree (1978).

either, because a disproportionate share of older trees were removed under the federal tree-pulling bonuses.

Since about 1964, new plantings and tree removals have resulted in a rapidly increasing proportion of trees less than 10 years of age and a decreasing number of trees 30 years and older. By 1977, almost 40% of all Annapolis apple trees were less than nine years old and less than 25% were over 30. These changes in tree-age structure are in sharp contrast to that of 1959 when only 10% of trees were 10 years or under and almost 50% were more than 30. Extensive recent planting, encouraged by the Tree Fruit Incentive, is contributing to a continued increase in the proportion of younger trees. Since maximum productivity for an apple tree occurs around the age of 15 to 18 years, the promise of potential high productivity places the grower, as well as the Annapolis industry, in a strong, future production position (Khera and Crowe, 1980).

4.3.6 Care/Management

The proportion of fruit trees receiving "first class" care increased from less than 50% in 1949 to over 80% in 1964 and neglected orchards declined from 15% to 2% (Nova Scotia Department of Agriculture and Marketing, 1950; Redmond and Embree, 1965). Orchard care was classified by the annual number of sprayings: first class was more than 6; second class was between 4 and 6; neglected was less than 4. Unfortunately, this type of data is apparently no longer available. The probable explanation for these changes is removal of many unkempt farmstead orchards or their integration into larger, better-managed units (Redmond and Embree, 1965).

Apple Maggot Control Board--During this period, the Apple Maggot Control Board acted to mitigate against a decline in the level and quality of care of apple orchards (see Section 3.2.3). As recently as 1978 to 1980, however, apple maggot infestations were found in about 28% of all registered commercial blocks (Nova Scotia Department of Agriculture and Marketing, 1981). Wild trees and native hawthorns still represent a substantial problem as sources of infestation.

Kentville Station: Integrated Pest Management--Pesticide use on well-managed orchards in the valley is now carried out in the context of the integrated pest management system for tree fruit, which the Agriculture Canada program at the Kentville Research Station has pioneered and developed for the region over the last 35 years. The system attempts to provide the most protection for the least cost by scientifically determining the most effective use of chemicals--timing, dosage, and type. In the Annapolis, approximately 10 sprayings per annum are used to control three major pests, including apple scab. While the $250 per hectare is a significant input, losses from pests are currently maintained at about 5%. Joint federal-provincial consultations with individual growers on how to deal with specific insect and disease problems anticipated that year are held each spring. The research and liaison efforts of the station have been a significant contribution to recent substantial improvements in pest management.

Kentville Station: Research and Technology Transfer--The experimental agriculture station at Kentville, established by the federal government in 1912, has carried out tree-fruit

research over the last 70 years. Current tree-fruit research areas include insect and disease control, orchard management, soil fertility, storage, breeding and cultivation evaluation, planting and pruning methods, and fruit processing technologies. One of the more significant contributions has come from apple rootstock research, aimed at improving rootstock tolerance to excessive soil moisture. Progress in this area, however, has been held up by staffing shortages. Breeding programs for apples and pears are scheduled to terminate despite potential benefits of this research (Nova Scotia Department of Agriculture and Marketing, 1981).

The Station is a joint federal-provincial facility, with a well-integrated relationship between the staff and function of both. Provincial staff play the primary extension role, but federal staff are also involved, participating in advisory meetings each spring with individual growers on implementation strategies and in-field evaluations, which deal with the problems of non-uniform soils in relation to fruit production. Growers are instructed on the necessary drainage, levelling, and contouring required for optimal soil bed preparations and on those pockets of land to be avoided altogether, such as areas of improper drainage and hardpan. Individual growers often seek advice regarding variety selection, pest problems, leaf and soil analysis, fertilizer use, and pruning methods.

Tests for and advice on how to carry out soil fumigation for fungus or nematodes on replanting sites are also available to growers. In addition, short courses in horticultural practices are offered at the Agricultural College at Truro. A weekly information newsletter is also published warning growers of current and anticipated problems, such as pests, and the recommended spraying schedules. The role of the research station and its personnel in intensifying and upgrading the management of orchard land clearly has been a substantial one (Crowe, 1957, 1982).

Weather Services--The availability of a telephone weather-recording service through the Atmospheric Environment Service, Environment Canada assists growers in planning their pesticide-spraying program for apple scab, since rain is the major determinant in the timing of scab development. The ability of growers to respond properly to this pest raises productivity and product quality.

Federal action, then, continues to contribute to product quality and the intensity of orchard use by increasing management and technology levels. The pulling and grafting bonuses of the late 1940s encouraged withdrawal and upgrading of older processing varieties, while the Apple Maggot Control Board helped to rid the valley of large-scale infestations of this pest. The recent Tree Fruit Incentive hastened the adoption of currently recommended varieties. Research programs based on Annapolis conditions have resulted in the availability of advice on improved land management, especially integrated pest management, variety selection, site evaluation, fertilizer use, and product storage. Increased tree density on improved and size-controlling rootstocks and the use of a better land base with greater productivity potential have also been facilitated by the research, testing, and outreach efforts of federal staff at the Kentville Station.

4.4 Labour Inputs

Most Annapolis orchards are family farms where, with the exception of pruning and harvesting, labour is carried out mostly by family members. While there is a trend to increased mechanization, the supply of qualified machinery operators is inadequate for present needs (MacDonald, 1981). Workers for winter pruning are also in short supply. Manual picking is done by local students, housewives, off-season fishermen from south and eastern shore counties, and service families from the Greenwood Base. This usually adequate supply of inexpensive labour has resulted in far less use of mechanization (e.g., girettes) than, for example, in the Okanagan. However, during the peak season from September to mid-October when the McIntosh ripen, there often is a shortage of 200 to 400 workers (MacDonald, 1981). Since McIntosh and Cortland apples ripen simultaneously, recent plantings of these varieties are expected to create an even more pronounced peak-picking season when they reach bearing age. An already serious shortage of seasonal accommodation for harvest workers will then be intensified. Processors rely with little difficulty on local labour for employment that ranges in duration from several weeks to year-round.

The Canada Farm Labour Pool tries to match workers to labour requirements. Run as a non-profit employment service, based in the valley and under contract to Employment and Immigration Canada, the Pool is advised by a local Agricultural Board and is widely used by larger growers to find workers for harvest and winter pruning. A provincial employment program also provides workers, mostly students, but only for summer pruning and maintenance on non-bearing orchards. Some workers have been brought to the Annapolis from Newfoundland under the federal mobility program in recent years, but further use of non-local labour is hampered by the lack of seasonal housing on or near orchards.

Federal money for this important requirement has been made available under federal-provincial Agricultural Employment Development agreements since 1976, although the province has not yet released this money. Under these Agreements (1976-1980 and 1981-1985), up to 50% of the cost of housing construction and/or renovations will be subsidized (the latter 1981 to 1985 only). The federal portion is 50%, up to $750 per worker and up to $10,000 per farm.

A significant shortage of farm labour, especially of skilled workers, could accompany the completion of the Michelin plant, which is expected to pay wages well beyond what farm labourers or processing workers can earn. The establishment of the plant may also raise the level of expectations of farm workers and result in increased costs to growers. These effects could stimulate more need for Employment and Immigration programs, such as the mobility program for interprovincial recruitment from Quebec, Newfoundland, etc. and the Offshore Labour Program. More "U-Pick" type operations could also arise and labour-intensive harvesting operations could become more mechanized. Alternatively, the plant may attract additional potential agricultural labour, such as shiftworkers and students, to the valley. The future impact of the Michelin Plant on the labour supply cannot be predicted easily.

Since the federal role in labour supply for

fruit-producers in the Annapolis is limited, the effects on land use are negligible, although it could become more significant if labour shortages become more severe in future.

4.5 Capital Inputs

Improvements in orchard size and farm management generally require infusions of capital. The federal Farm Credit Corporation (FCC) offers full-time farmers loans of a maximum of $300,000 at long-term government bond rates to establish viable farm units (Fisher, 1981; Geense, 1982). Syndicates of three or more farmers can borrow up to 80% of costs up to $100,000 for joint purchases of machinery, equipment, or buildings (Farm Syndicates Credit Act). Interest rates for both programs change every six months with market trends. (For the period ending in October, 1982, these rates were fixed at 16.5%.) In addition, Farm Improvement Loans, available through banks and other lending institutions, provide up to $75,000 for livestock, equipment, construction, land, etc., at the prime rate plus 1%. FCC loans, however, are little used by Annapolis growers. Between 1975 and November 1980, only two loans totalling $120,000 were granted to all types of fruit enterprises in southern Nova Scotia.

The superior provisions of the provincial farm credit system have been more attractive to Annapolis fruit growers. Nova Scotia's Loans to Commercial Farms Program offers loans up to $300,000 at 10% interest on the first $150,000 and 13% on the second, and 15% on the balance up to 90% of the land value (rates as of April, 1982; Geense, 1982). Young farmers, under age 35, can obtain loans at 10%, the first two-years' interest forgiveable, on the first $150,000. Part-time farmers with farm sales over $5,000 within five years can borrow up to $45,000 at 13%. Commercial farmers with outstanding loans from the FCC, Veterans Land Act, or the Nova Scotia Farm Loan Board are eligible for an interest rate subsidy of 2.5%. Farmland can also be leased at 5% of the purchase price, with an option to purchase after five years. These programs are all administered by the provincial Farm Loan Board.

Other federal programs have provided capital for orchard improvements, for the tree-pulling bonuses and grafting subsidies of the 1940s, and the Tree Fruit Incentive and Land Clearing and Improvement Project of the recent agricultural sub-agreement (see Section 3.2.3). Recent federal interest rate policy, however, has had a significant negative impact on capital availability and cost, a problem only partially offset by the provincial farm credit system, which has also seen recent substantial rate increases. Its interest rates for commercial farmers, for example, rose 43% from 7% to 10% between May, 1980 and April, 1982 on the first $150,000 borrowed.

4.6 Revenues

Since 1972, prices per unit of production for Nova Scotia apples (adjusted for inflation) have been about 25% above the norm for the post-war period and sharply above those of the previous 17 years (see Table 4.8 and Figure 4.1). Only in the periods from 1945 to 1948 and 1952 to 1954, times of transition and high uncertainty in the industry, have adjusted prices exceeded those of the last decade. Prices have remained unusually stable since 1976, varying only by about 6% from the average of $169 (1980 dollars) per tonne. Good and stable prices together with planting

TABLE 4.8

Mean Farm Prices for Nova Scotia Apples, 1946 to 1980

Year/Period[a]	Mean Current Farm Price ($/tonne)[b,c]	Mean Price in 1980 Dollars ($/tonne)[b]	Mean Annual Production (000's tonnes)	Total Farm Price of Apples in 1980 Dollars ($'000)[c]	Period Characteristics
1980	$147	$147	47	$ 6,925	
1972-80	$121	$169	45	$ 7,450	Stable, low production. High prices: unstable to 1975; stable 1976 to 1979. Exports low and stable.
1967-71	$ 53	$119	56	$ 6,700	Slightly higher mean production, but declining. Low and falling prices. Exports low and declining.
1960-66	$ 50	$135	53	$ 7,175	Higher, rising production. Higher, stable prices. Exports higher, but declining once again.
1955-59	$ 32	$ 97	46	$ 4,375	Erratic production. Lowest prices since war. Exports increased, high.
1952-54	$ 59	$183	31	$ 5,450	Very low production. High, unstable prices. Exports low.
1949-51	$ 36	$123	48	$ 5,875	Falling production. Falling prices. Exports low.
1946-48	$ 44	$186	76	$15,025	High, but falling production and prices. Exports low.
Average	NA	$141	50	$ 7,200	---

NOTES: NA--Not applicable.
[a] Periods based on price characteristics described in last column.
[b] Not weighted by annual gross volume of production.
[c] Using Consumer Price Index.

SOURCES: Derived using Statistics Canada (1981a, 1982b); Nova Scotia Department of Agriculture and Marketing (1980a).

assistance, in fact, have been largely responsible for the present resurgence of the industry. Total valley farm revenues for apples, however, have declined by more than 50% (in constant dollars) since the post-war period, reflecting the decline in both production and land base. Nevertheless, having bottomed in the late 1950s, the adjusted farm value of production in constant terms increased by more than 70% between 1972 and 1980.

The returns of $169 per tonne (1980 dollars) for the period 1972-1980 compare to Khera and Crowe's (1980) estimated $137 per tonne costs of production, under good management, for the semi-standard planting system (see Section 4.6.3). Net positive returns of about 25% are suggested by these data. While the approximately 85 larger growers can provide adequate returns (see Table 4.9), the mean gross income of all growers (likely around $20,000 in 1980) would not result in sufficient returns. For many of the approximately 350 smaller growers, with about 25% of Annapolis fruit trees, orcharding must be a secondary activity to producing other crops, wage earning, or retirement.

Revenues per unit of production have increased substantially during the last decade (Table 4.9). Increases in production per unit area of land and in mean orchard size have augmented gross revenues to growers primarily through greater production per grower. While it is difficult to determine the extent to which each grower's revenues have increased, Table 4.9 suggests that adjusted gross income for orchard operations has risen four to five times in the past 30 years. This trend has been brought about by a reduction in the number of growers, increased specialization, and larger average unit size. Larger growers on the average continue to realize increasing revenues.

4.6.1 The Federal "Safety Net"

Assistance to ensure that growers' revenues meet a minimum level is provided by three federal programs. These programs act as a type of "safety net," cushioning the effects of low production levels or poor prices for agricultural commodities. Federal assistance is provided through the following:

1) Agricultural Stabilization Board--price support, protection against significant declines in market prices;
2) Agricultural Products Board--protection against major surpluses in the market;
3) Crop Insurance--protection against production loss.

These programs are intended as temporary measures to protect commercial growers and are not long-term support for non-productive operations.

Agricultural Stabilization Board--This agency makes deficiency payments directly to producers in years of low returns that usually arise from domestic or international surpluses or from rapid increases in input costs. The Stabilization Board intervenes when returns for a specific commodity fall below a prescribed percentage (usually 90%) of the previous five-year average, indexed for inflation in production costs. Since all producers of a commodity receive the same deficiency payment per kilogram, the more efficient producer gets relatively more assistance. Uniform payment is designed not to interfere with existing advantages based on management and the land resource. The Board's most notable intervention in this context

TABLE 4.9

Farm Value of Apple Production, Number of Growers, and Gross Income, Nova Scotia, 1949 to 1976

Central Year of Five-Year Period	Average Farm Value of Total Apple Production In 1980 Dollars[a]	All Growers		Larger Growers[b]		
		Number[a]	Average Gross Income to Nearest $25 In 1980 Dollars	Number	Percentage of Trees	Average Gross Income to Nearest $25 In 1980 Dollars
1949	$7,211	2,003	$ 3,600	139	36%[e]	$18,725
1964	$7,325	798	$ 9,175	73	52%	$52,175
1973	$6,760	485	$13,400	77	71%	$62,325
1976	$7,539	442	$17,050	85	75%[e]	$66,525

NOTES: NA--Not available.
[a] 1949, 1976--holdings greater than 0.8 ha; 1964, 1973--30 trees.
[b] 1949--holdings greater than 12.1 ha; 1964, 1973--1,600 trees; 1976--13.2 ha.
[e] Estimated values assuming percentage of trees equals percentage of income.

SOURCES: Derived using Nova Scotia Department of Agriculture and Marketing (1950, 1980a); Redmond and Embree (1965, 1974); Statistics Canada (1978a, 1981a).

occurred in 1975-76 when Nova Scotia producers of apples and pears were paid almost $1.3 million in subsidies (see Table 4.10). There is nevertheless much criticism from growers regarding the maximum amount of these stabilization payments; for example, in 1976, the maximum payment to an apple producer was $11,025.

Agricultural Products Board--The Products Board acts under approval of the Governor-in-Council when limited intervention in a regional market can prevent substantial losses arising from supply/price fluctuations. Rather than subsidize the individual grower, the Board usually contracts with a processor or wholesaler, who sells the product later when sale will not interfere in the domestic market. The Board tries to break even, but has absorbed losses or exported surpluses as foreign aid. In 1976-77, the Board bought $982,000 of Nova Scotia apples (see Table 4.10). In 1980-81, the Board provided a two-thirds subsidy for transportation of surplus Ontario juice apples to Nova Scotia for processing, using back-haul capacity associated with potato shipments. The effects of a shortage in the Nova Scotia crop were thus ameliorated and imports of US apples avoided.

Crop Insurance--In contrast to the market support offered by the Stabilization and the Products boards, crop insurance is intended to

TABLE 4.10

Federal Income-Support Payments, 1975 to 1981

	Payments ($'000)	
	Nova Scotia	Canada
Agricultural Stabilization Board:		
Apples (1975-76)	1,276	12,830
Summer Pears (1975-76)	12	258
Summer Pears (1976-77)	38	931
All Other	---	7,911
	1,326	21,930
Agricultural Products Board:		
Apples (1976-77)	982	982
Apples (1980-81)	(273)	273
All Other	---	3,045
	1,155	4,300

SOURCE: Agricultural Stabilization Board (1981, 1982).

provide protection against natural hazards that occur during the production stage. It does not cover losses resulting from poor management practices, such as those from apple scab. Crop insurance programs are constituted under Nova Scotia law and are administered by the province. The federal government subsidizes 50% of the premium, while the province pays all administrative costs. The program guarantees returns from production, usually 80% of the five-year average production level of a given producer. For the 1982 growing season, 75 growers were registered, the majority holding 10 or more hectares (Craig, 1982).

These three programs together can ensure that a grower is not forced to abandon agriculture through circumstances that are beyond his control, such as seasonal fluctuations in markets or growing conditions. This element of certainty adds stability to orchard care, maintaining management skills and encouraging long-term inputs to orchards. While there are no concrete measures of utility outside of dollar value of support, these programs help the producer to preserve and expand orchard area and improve management skills.

4.6.2 Cash Flow

Advanced Payments for Crops--Payments for apples in storage may be advanced to growers by two means:

1) the Agricultural Products Co-operative Marketing (APCM) Act;
2) the Advanced Payments for Crops Program.

Under the APCM Act, the federal government promotes orderly marketing by providing loan guarantees that allow a co-operative or producer group to finance initial payments to growers when a crop is still in storage. If, after handling and processing costs, revenues are less than the initial payment to growers, the federal government pays the difference. The Advanced Payments for Crops Program advances interest-free loans to individual producers in the fall to pay production and marketing expenses.

Since 1977-78, these programs have been used extensively by groups of producers in Nova Scotia, though many growers consider the level of 6.6 cents per kilogram for apples and the $15,000 limit per producer to be too low. Both programs assist the cash flow of producers and therefore contribute to market stability and the management and capitalization of orchards.

4.6.3 Production Costs

Costs of production for an apple orchard directly influence net revenue, and are, of course, dependent on the level of management and the density of planting. Table 4.11 demonstrates that the lowest costs are associated with the recommended density of the medium orchard system (60% of standard tree spread or 383 trees per hectare), and the higher costs with either size extreme. Use of the semi-standard system, the most typical in the valley, increases costs only minimally, while in the standard system, costs are more than 18% higher. An average cost of production for Annapolis apple growers in 1980 therefore would have been that of the semi-standard system, approximately $137 per tonne or 4% above the optimal $132 per tonne. Costs would be less than average for the more progressive, commercial growers whose product quality and returns would also be greater. To the extent a grower made use of the various

TABLE 4.11

Production Costs for Apples, Nova Scotia, 1980

Orchard System (% of standard tree spread)	Average Density (trees per hectare)	Estimated Production Costs, 1980 ($ per tonne)[a]	Surplus Cost over Optimal
Standard (100%)	143	$156	+18%
Semi-Standard (80%)	240	$137	+4%
Medium (60%)	383	$132	---
Semi-Dwarf (40%)	840	$139	+6%
Dwarf (20%)	1,794	$157	+19%

[a] Production costs assume probable yield, price, and cost conditions and include production, management, and land costs. Assume 10% cost of capital.

SOURCE: Table 4.4 in Khera and Crowe (1980).

provincial and federal subsidies, these costs of course would be lowered. Researchers at the Kentville Station have demonstrated the cost effectiveness of the denser planting systems and, by promoting them, have also encouraged greater productivity and revenues (e.g. Khera and Crowe, 1980).

By ensuring a minimum level of revenue, mitigating cash flow problems, and increasing net revenues through contributing to lower costs, these federal programs assist tree-fruit growers by encouraging them to remain and build on current expertise and to make long-term plans and investments in the land base. The calibre of land management is thus heightened and expansion of the land base encouraged.

4.7 Federal Land-Use Impact Through Farm Viability

Federal programs have affected land use by encouraging scientific land management practices and promoting and ensuring increased and stable revenues for growers. The programs reviewed in this chapter have been assessed generally in terms of three principle mechanisms vis-a-vis land use: improved orchard management and the consequent increased land productivity, capitalization, which also generally represents opportunities for improvements in management and productivity, and changes in orchard area, as a result of management and capitalization improvements. A summary of these assessments is presented later in Table 6.1.

The most significant federal land-use impacts through production economics have been the Tree-Pulling and Grafting bonuses of the 1940s, the Tree Fruit (planting) Incentive (1976 to 1981), federal research and liaison activities, the federal "safety net" for grower revenues, and recent high interest rates. The tree-pulling bonuses, which encouraged poorly-managed land to be withdrawn from production, tended to raise the mean

level of management on Annapolis orchards. While productivity has not risen demonstrably since the early 1960s, substantial improvements have occurred in management since that time, which should now be translating to land productivity increases. To the extent that average productivity has increased as a result of federal actions, there has also been a reduced requirement for land base. Yet those programs, which yield more stable and/or better prices, such as the "safety net," tend to encourage expansion as well as to discourage withdrawal of orchard area. High recent interest rates, on the other hand, have discouraged investment and expansion and encouraged bankruptcy. In general, farm viability is assisted by numerous federal policies and programs, resulting in largely positive land-use impacts in the Annapolis Valley.

5.0 MARKETING

> Throughout the period, marketing, as well as production, was individualistic. Growers, agents, and speculators enjoyed a wide range of freedom of action. Growers either packed or shipped their apples to a consignee or sold either on a tree-run or packed-out basis to agents or speculators.... A formal centralized marketing or selling structure did not develop. (Morse, 1952, 41)

Markets have been the single most important factor influencing the amount of land used for tree-fruit production in the Annapolis Valley. This section briefly examines the historical background of marketing and federal assistance to the industry (Section 5.1). Current federal contributions to the industry's infrastructure are analysed (5.2). The chapter then focusses in turn on the fresh fruit sector, both domestic and export markets (5.3), and the processing industry (5.4), examining the nature and impact of federal programs. Finally, the land-use impacts through marketing are summarized and assessed (5.5).

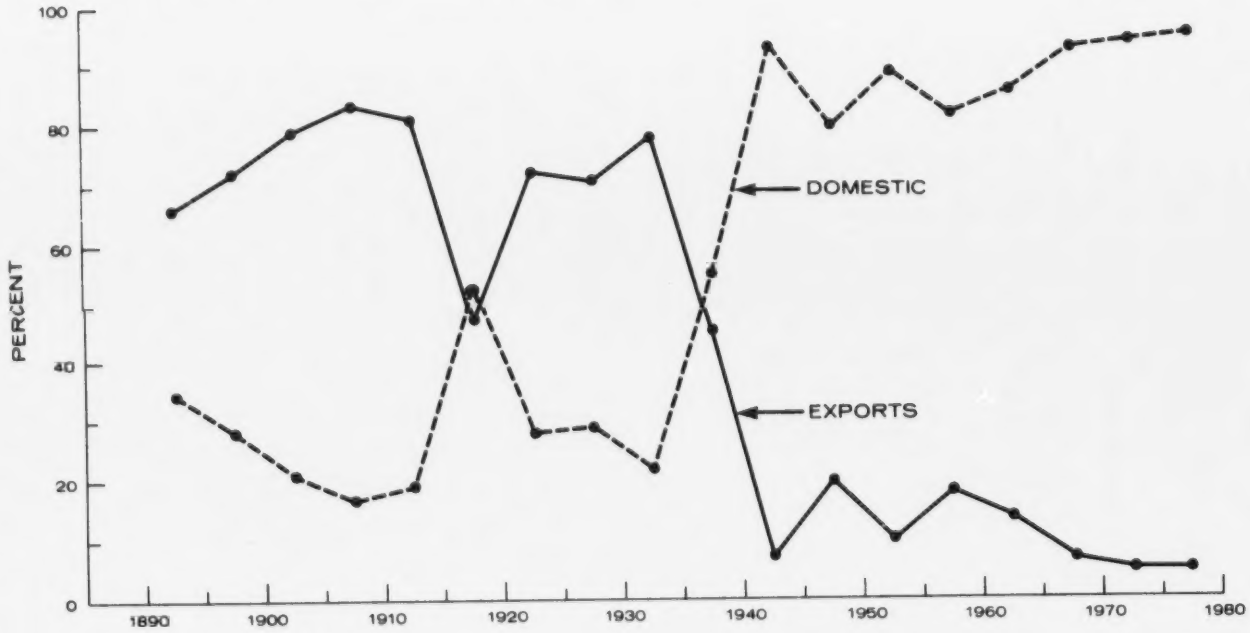
5.1 Historical Problems and Federal Assistance

Early success in the lucrative and open British market, with its freedom of access for food producers, led to substantial expansion in the apple-growing industry after 1880. At the same time, little attention was paid to the Maritime and New England markets, the latter being complicated by competition and an import duty (Mulder, 1964, 8). Figure 5.1 illustrates that after 1891, generally 70% to 80% of production was devoted to exports. By 1900, producers were concentrating on late-keeping, hard-textured, winter apples, capable of withstanding the handling associated with ocean transportation while packed in barrels. These apples were bought by a limited number of British importers or distributors (Morse, 1952).

After 1918, competition from American, Commonwealth, and British Columbia growers who marketed better-quality, boxed apples, challenged the valley's traditional share of the British market. Despite these problems, central selling was resisted and economies of production were emphasized instead. By the late 1930s, increased competition and import restrictions were seriously affecting the industry's traditional markets.

The Ottawa Contracts and the Marketing Board--During World War II, a domestic oversupply in Canada was created by various export restrictions, such as limits on capital available for Britons to purchase non-essential imports and the lack of assured space. Because of the regional nature of the domestic market, the Nova Scotia apple industry experienced the greatest difficulty of any region. The Nova Scotia Apple Marketing Board was established by the federal government under the War Measures Act to negotiate and administer annual assistance contracts with the federal government (the Ottawa Contracts) and to market the entire crop. While the terms of each annual contract differed, federal assistance generally consisted of purchase or subsidy payments for apples, subsidies for the processed product (often for export to Britain), and

FIGURE 5.1
HISTORICAL DISPOSITION OF NOVA SCOTIA APPLES
1891 TO 1979



NOTE: Data are five-year averages.
SOURCES: Morse (1952); Nova Scotia Department of Agriculture and Marketing (1976, 1981).

tree-pulling bonuses (see Section 3.2 and Table A.2).

A fledgling processing industry had been growing through the 1930s, mostly for low-grade fruit (Morse, 1952). Federal assistance through the Ottawa Contracts protected the apple industry from the collapse of the export market during and immediately following World War II through an artificial increase in the volume and importance of the processing market. With the first contract (1939), 14 plants with a combined capacity of over 500 tonnes per day were added to the seven already in existence. These processed mainly dried apples, but also canned apples and applesauce. Over two-thirds of war-time production was processed, a dramatic increase from the less than one-fifth taken by processors during the 1930s.

The Marketing Board also tried to increase fresh local sales by improving the supply system. Fresh input to the domestic market was expanded to about 20% of total production, more than double the proportion of the mid-1930s, by increasing sales in the Maritimes, Newfoundland, and Quebec (Morse, 1952). In some years, Quebec was the primary outlet for fresh Annapolis apples.

After World War II, the export market did not re-open, because of a declining British market that resulted from foreign exchange shortages, increasing domestic production, and trade protection measures. While there was a market for dessert apples, Nova Scotia could not supply them. The industry consequently restructured by upgrading tree varieties, contracting tree stock, and improving handling infrastructure. In spite of opposition to central selling, the United Fruit Companies (UFC) developed four large cold storage facilities with a total capacity of over 17,000 tonnes. One-quarter of the $1.1 million total cost was federally subsidized. Box pack was introduced to the industry by the Marketing Board. The number of trees and growers were reduced, and fruit quality was improved through changes in variety use, encouraged by federal and provincial assistance.

From 1939 to 1950, a total of at least $16 million was input to the industry from the federal treasury (Table A.2). This assistance ensured that the Nova Scotia apple industry survived the war, though growers generally did not even recover their costs (Morse, 1952). Support for the Marketing Board eroded with poor returns on the successive crops of 1949 to 1951, with problems encountered on the fresh local market, and due to the lack of a government contract for the Board to administer. In 1951, a vote of the Nova Scotia Fruit Growers' Association (NSFGA) suspended the Board's operations. While narrowly endorsing the principal of central selling, the industry nevertheless reverted to free selling. The UFC, however, had increased its proportion of production so that by 1950 its companies handled almost two-thirds of production. While the Marketing Board had helped to stabilize prices for domestic fresh fruit in the Maritimes, it was unable to establish a central agency with control of fresh-fruit shipments.

Federal intervention in marketing, through the Ottawa Contracts and the Nova Scotia Apple Marketing Board, was instrumental in the successful adjustment of the industry to the vastly different market demands which followed World War II. The industry survived through

the establishment of a processing industry which could deal with surplus fruit, the trends to a smaller, better-quality land base, lower volume, and fresh and dual-purpose varieties, and the expansion of the domestic market. A federal role can be identified in all these. The industry emerged leaner and more efficient, with the ability to withstand further erosion of its export markets in the late 1960s. While centralized marketing essentially ceased with the end of the Ottawa Contracts, the Scotian Gold Co-operative (established in 1957 to replace the UFC) now markets about 50% of the valley's apple crop and represents about 60% of family-owned orchards.

5.2 Infrastructure Support

Federal assistance for the development and use of marketing infrastructure in the Annapolis includes:

1) assistance for handling from orchard to packing plant or processor (Bulk Bin Construction Project);
2) storage construction subsidies;
3) applied storage research to extend the marketing season for Annapolis apples;
4) subsidies for transporting Annapolis fruit products (Maritime Freight Rate Act);
5) provision of improved market/production data.

Bulk Bin Construction Project--Under the recent agricultural sub-agreement, this project provided $750,000 (80% federal) for the purchase of bulk bins to improve handling efficiency and product quality. These bins replace outmoded one or one and a quarter bushel boxes. The grant of $10 per unit contributed about 40% of costs up to $2,000 per grower and 37 bins for each producing hectare. A total of 136 growers made use of the grants in the first four years (from April, 1976 to March, 1980). About 40% of the bins were constructed by processors. A total of 71,000 bins were subsidized up to 1981, a number equal to the total pre-1976 inventory and about 95% of the project goal. About 90% of the bins are used by the tree-fruit sector (Dargie, 1982). If 37 bins can be assumed to service fully one hectare of land, at least 1,920 hectares, or over 40% of the valley's fruit-growing area, were subsidized for this improved handling capability. (Not all of this is newly serviced land, however, since some of the bins are replacements.) The resulting improved fruit quality, and consequent greater marketability, promote increased orchard area and better land management. In addition, the proportion of bins owned by growers increased by over 40%, to 46% of the total, giving growers more flexibility in where to deliver their produce and potentially higher returns.

Storage Construction Assistance--One-third funding for agricultural storage infrastructure to a maximum of $500,000 is available under the Fruit and Vegetable Storage Construction Financial Assistance Program (Agriculture Canada). The program supersedes the Cold Storage Act (up to 1964), which provided for 50% assistance for cold storage warehouse construction. While a total of $4.9 million was provided for for apple storage facilities between 1973-74 and 1979-80 (Trant, 1980), only $70,000 (1.4% of the national total) was taken up by Nova Scotia fruit concerns (Hunter, 1980). The continuing low proportion of Canada's controlled atmosphere storage capacity for apples (6% in both 1969 and 1979), as well as of cold storage capacity, reflects the valley's greater orientation to processing. Table 5.1

TABLE 5.1

Apples in Storage, Nova Scotia, November 1, 1980

	Controlled Atmosphere	Cold Storage	Common (Heated)	Total
Nova Scotia				
tonnes	4,634	10,802	4,376	19,812
%	23%	55%	22%	100%
Canada %	31%	66%	2%	100%
Nova Scotia % of National Total	4%	5%	53%	6%

SOURCE: Agriculture Canada (1980).

shows apple storage holdings in 1980; about 40% of Annapolis production is stored before sale or processing. Yet, more than half of the country's least technologically advanced storage, common or heated only, is located in Nova Scotia. The construction assistance has clearly had no appreciable land-use impact in the Annapolis.

Low Oxygen Storage Research--Kentville Research Station is researching and advising grower groups on the applicability of a new technology for low-oxygen storage of apples (Lidster, 1981). Two potential advantages can be seen for Annapolis growers--the potential for extending the season for selling a "quality" product on the domestic market to April-July, and possibly beyond, and the increased possibility of fresh export sales with a higher quality product at point-of-sale. Both would result in increased demand and encourage expansion in orchard area. While Kentville is a leader in this research, BC growers are quickly adopting commercial low-oxygen storage (Greenwood, 1981). International producers will probably also do so, partially offsetting any comparative export advantage for the Annapolis.

Maritimes Freight Rate Act--Under this Act, in effect since 1927, such products as regionally-produced fresh or processed fruit are eligible for a 15% transportation subsidy within the Atlantic region. Paid to the transporter, the subsidy permits Annapolis fruit to remain competitive throughout the region, where most of it is sold.

The Act also provides a 50% subsidy for fresh or processed fruit being shipped west by rail or truck (Westbound Selective Assistance Program), assisting the marketing of processed products, especially juice in central Canada. Thus, a portion of the current fruitland area is maintained. Since juice takes the lowest quality fruit, there is less incentive to intensify land use and upgrade management efforts, but supporting an outlet for juice may help to ensure the sale of all apples from an orchard operation. If juice apples provide the margin of profit even for progressive growers, these subsidies can contribute also to improved management and expanded land area.

Market/Production Intelligence--In a recent project, Agriculture Canada assembled retrospective and current data on apple production and marketing into one publication. The department will also provide timely (February) data to the industry to allow development of suitable domestic marketing strategies. A Consumer Apple Marketing Study was prepared in 1978-79 supported by a $78,000 (61%) grant also from Agriculture Canada (Moore, '980). This information on why people buy apples and apple products, what they use them for, and what their preferences are should also allow the industry to market more effectively in Canada. The Department of Industry, Trade and Commerce recently completed an extensive analysis of 1980 apple imports, which should assist the industry in responding more appropriately in the challenge to replace foreign imports, an important consideration in the Atlantic market.

The key federal inputs to marketing infrastructure appear to be:

1) bulk bin construction assistance;
2) low-oxygen storage research program;
3) provision of an improved and more accessible production/marketing data base.

The first two attempt to upgrade the quality and condition of Annapolis fruit in the marketplace and to extend the marketing season. These changes are particularly important for the Nova Scotia industry, since the condition and quality of its fruit have been a traditional problem, due to its early emphasis on the "barrel" sector. The recent Consumer Apple Study indicated that "freedom from bruises/blemishes" is the most important quality of apples sought by consumers in the region, while firmness is most valued in the rest of Canada (Moore, 1980). Raising product quality and increasing the period of availability are essential in maintaining and expanding domestic and other markets, which in turn could maintain or increase fruitland in production and encourage trends to more intensive orchard land management.

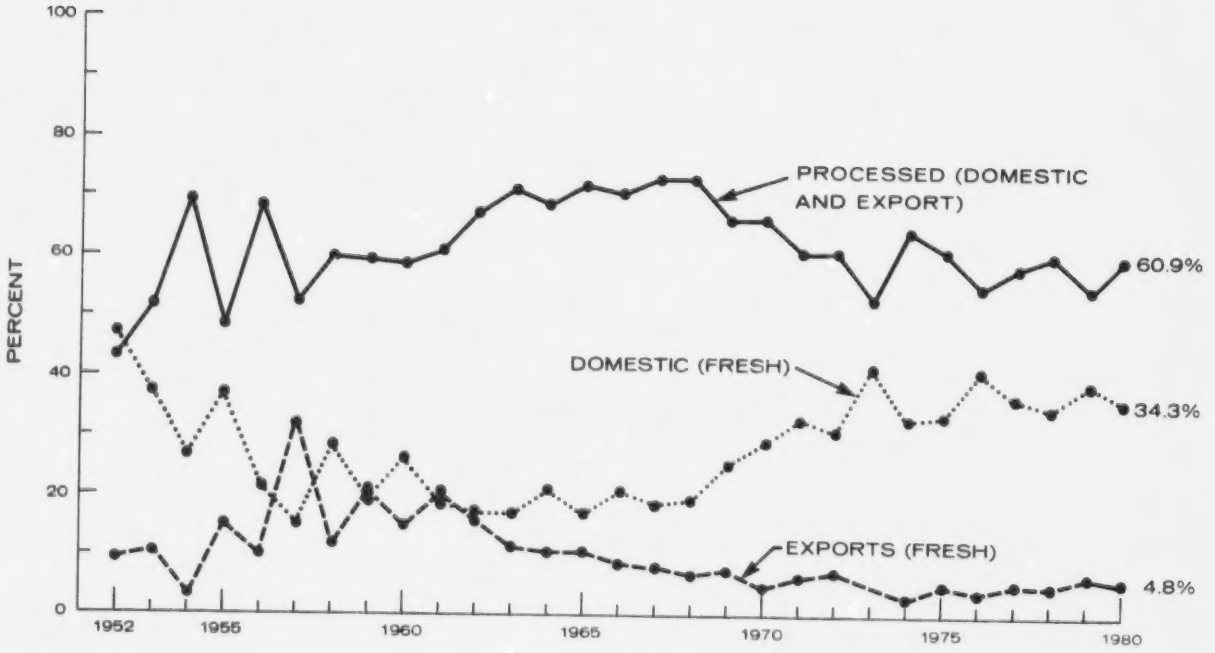
5.3 Fresh Sector

5.3.1 Domestic

Fresh apple sales have become more important since the early 1960s, increasing from about one-fifth to 38% of production by the late 1970s (Figure 5.2), and now representing about 60% of the total dollar value of apple sales. As a proportion of the national fresh market, Nova Scotia apples supply about 8%, an increase of one-third in this period. Fresh sales rose in the same period by 80%, from 9,400 to 17,000 tonnes. Record prices for fresh apples in the late 1970s, reflecting generally strong international markets, would appear responsible for the high level and proportion of these sales.

The predominant market for Annapolis fresh apples is now in Nova Scotia itself, which accounts for almost 75% of all fresh sales (Table 5.2). Per capita consumption in Nova Scotia is 40% above the national average; largely because of this, consumption in all Atlantic Canada is also 20% above the average. The largest outside market is Newfoundland where Annapolis apples meet about 60% of all fresh sales. Considerably smaller amounts go to Prince Edward Island and New Brunswick where Quebec, American, and local apples also compete. Competition from Quebec and New Brunswick growers will be reduced over the next several years while these areas recover from the devastation of the winter of 1980-81.

FIGURE 5.2
USE OF NOVA SCOTIA APPLE PRODUCTION,
1952 TO 1980



SOURCES: Nova Scotia Department of Agriculture and Marketing (1976 , 1981).

TABLE 5.2

Average Fresh Sales of Nova Scotia Apples, 1974-1975 to 1977-1978

Market	tonnes	% of Fresh Sales	NS Apple Sales Per Capita (kg)
Nova Scotia	13,203	73%	16.2
Newfoundland	2,067	11%	4.3
New Brunswick	495	3%	0.9
Prince Edward Island	452	3%	4.4
Foreign:	1,891	10%	NA
Great Britain	(1,241)	(7%)	---
West Indies	(268)	(1%)	---
United States	(200)	(1%)	---
	19,994	100%	

NA--Not applicable.

SOURCE: Derived from Robinson (1978).

From 1974-75 to 1977-78, Annapolis apples provided 53% of the fresh requirements of Atlantic Canada, while New Brunswick supplied 17%, and British Columbia and Quebec together another 11% (Robinson, 1978). Foreign imports accounted for 19% of fresh sales from 1978 to 1980, 18% lower than from 1974 to 1976, but three times the amount of Nova Scotia exports (Nova Scotia Department of Agriculture and Marketing, 1980a, 1981). Imports come mainly from the U.S. Robinson, 1978), mostly in the period May to July and largely from Washington State. Domestic supplies are low at this time, because of the lack of controlled-atmosphere storage holdings and the poor keeping qualities of the McIntosh variety (which makes up almost 60% of fresh sales). The low-oxygen storage research at Kentville (Section 5.2) could therefore assist significantly in replacing imports within the regional market. Increased consumption of Annapolis apples in both Newfoundland and Prince Edward Island represents another area for sales expansion within the Atlantic region (Robinson, 1978).

There is unfortunately little co-operation among agencies in the marketing of Annapolis apples, with at least three large concerns selling to the domestic market. About 40 to 50% of the fresh market apples are handled by the Scotian Gold system pool, which tends to provide an umbrella price for other sellers. Individual growers also market independently in outlying areas, such as the south shore of Nova Scotia, a practice called "peddling."

Promotion--In 1980-81, Agriculture Canada assisted the national apple industry with a $78,000 matching contribution for National Apple Month, a domestic promotion for selling a record crop. Although the promotion was successful, the short Annapolis crop that year limited the benefits for these growers. Agriculture Canada also assisted 1981-82 promotions through advertisements and has undertaken a promotion campaign through trade fairs and the development of resource kits for schools (at a cost of $45-50,000 in fiscal 1981-82). The establishment of the Marketing and Economics Branch and the new Agri-Food Strategy demonstrate the emphasis now being placed on marketing (Minister of Agriculture, 1981). One of the first initiatives is the new Canadian Agricultural Market Development Fund (CAMDF), which provides financial assistance for the long-term development of domestic agricultural markets, through the following: market research; on-site promotions; new product/process development; and consolidation of producer organizations (Agriculture Canada, 1982). Assistance of up to 50% of eligible costs of projects may be provided under CAMDF.

Tariffs/Import Surtax--There are no tariff barriers protecting the fresh apple market. Imports into Atlantic Canada are relatively limited; about 60% enter the market in May to July, well out-of-season (May to July; Robinson, 1978). One-quarter of the US imports arrive in-season (August-November), but represent only a small portion of total fresh sales then.

Protection against low-priced imports, those priced lower than 85% of the previous three years' imports, can be invoked through an import surtax, though the industry regards this definition of "injury" as too low. The approval period (about four weeks) and the detail of data required also make application complicated and time-consuming. The industry is forced to develop an extensive permanent data base if the surtax is to be an effective protection in these situations.

The federal government could play a larger role in the domestic fresh market through initiatives under the Agri-Food Strategy. By its absence thus far, however, the government may have missed opportunities for the development of this market and consequently diminished potential orchard area in the valley. To the extent that further domestic apple sales would diminish domestic sales from other Canadian apple-growing regions, however, this could represent a zero-sum game.

5.3.2 Exports

Exports have never recovered to any significant degree to their pre-World War II levels, though they did climb to about 20% of production in the period 1955 to 1962 (see Figure 5.2). From 1976 to 1980, exports accounted for only about 5% of production, or 2,315 tonnes, an absolute decline of 20% from levels achieved in the late 1960s. Britain's entry into the EEC in 1973 was the final in a series of factors that contributed to the loss of this export market: devaluation of the British pound; British devaluation compensation for Australian exporters of processed products; import quotas; and EEC agricultural subsidies which have resulted in fresh European apples entering the British market at low prices (Shaw, 1971).

The Nova Scotia industry still competes in the British market, which now takes about

two-thirds of its export sales. This level of sales, however, is less than that to Newfoundland. At least three Nova Scotia concerns compete separately, supplying primarily McIntosh apples to the British market. There is substantial competition in this market from EEC growers, particularly from France, which has aggressively and successfully marketed its Golden Delicious apples to the detriment of even Britain's apple industry. Quebec growers are also major suppliers of McIntosh to this market. Beyond minimal inroads into Jamaica and Trinidad, the lack of adequate refrigeration capacity, import restrictions, and the low potential for volume have mitigated against larger export markets in the West Indies. Nova Scotia growers must also compete with US and Ontario producers there. Recent production increases in the US do not encourage expectation of much future expansion of sales to that market.

Trade Promotion--The Program for Export Marketing Development (PEMD) of the Department of Industry, Trade and Commerce (ITC) subsidizes exporters' costs in penetrating foreign markets. The exporter is required to return the government contribution only to the extent that the market is established; repayment is required under GATT regulations. A special food component was recently added to this program. In 1979-80, an ITC advertising campaign in Britain conducted through the Nova Scotia Fruit Growers Association was considered unsuccessful, largely because of inadequate point-of-sale material. Agriculture Canada is in the process of establishing the Agricultural Export Corporation (CANAGREX) to assist in developing and sustaining export markets for agricultural products through financing export infrastructure (e.g. warehouses in Miami) and long-term export commitments with marketing boards. The Nova Scotia industry appears ready for some level of international cooperation.

Refrigerated Containers--The 80% federally-funded Refrigerated Containers Incentive Project of the recent agriculture sub-agreement has provided a $600,000 subsidy (approximately 65% of cost) to the tree fruit and blueberry growers' associations of Nova Scotia for the joint purchase of 40 (12.1 metre) refrigerated containers. With the 20 already held by these organizations (some aided by 100% financing by the Province), these containers remove the impediment to exports created by the lack of dedicated refrigerated space and the loss of quality associated wwith excessive handling. The containers also reduce theft in the handling process in European ports and provide income to the associations from rentals to freight companies in the off-season.

The purchase and full utilization of these containers has helped to strengthen the apple market (Nova Scotia Department of Agriculture and Marketing, 1980b). The 1,700 tonnes of tree-fruit shipments moved by the associations' containers in 1979 represented almost 60% of total exports in that year.

Exports in 1979 reached 2,970 tonnes, exceeding average exports from 1974 to 1977 by 41%, although values for 1980 and 1981 were off by almost one-half (Campbell, 1981). The ability of the industry to maintain its position and further penetrate the difficult British and other export markets has been enhanced by the acquisition of these refrigerated containers. The federal

government has assisted the industry in at least holding its portion of this market and therefore in maintaining the level of orchard area attributable to exports. There is potential for further expansion, but it requires considerable on-going effort.

5.4 Processing Sector

Since the early 1960s, consumption of apples for processing has fallen by about one-third to 26,700 tonnes (in 1976-80), and the proportion of the crop processed has declined by more than 15% to a level of 57% (see Figure 5.2). This decline was largely in canned solid packed apples, pie filling, and vinegar products, which were shipped to Britain before imposition of EEC and other trade barriers (Nova Scotia Department of Agriculture and Marketing, 1980b). Canned apples have declined from about a third to 10% of production since 1965. However, these levels still represent 90% of Canadian output. Juice and concentrate production, mainly for the domestic market, while decreasing slightly in absolute terms, increased to almost 70% of all processed apples. With increasing consumer demand for juice, the traditional low price to farmers for juice apples is beginning to rise. Reconstitution of imported juice concentrate has allowed Annapolis processors to meet some of the domestic market during a period when strong fresh prices have sometimes led to a shortage of local juice apples. Sauce production has also risen from about 5% prior to 1965 to 15% of the total crop; Nova Scotia produces 20% to 30% of all Canadian sauce.

The proportion of pears processed has declined by over one-third from 57% in 1969 to 37% in 1979. Imports dominate even local consumption of both fresh and processed pears, and good fresh prices limit the amount of fruit available to processors (e.g., 1979: $270/tonne for fresh versus $142/tonne for processed).

Tariffs (Pears)--Under the former Australian Trade Agreement of GATT, low-priced canned pears from that country penetrated the Canadian market at a preferential rate after the early 1960s. Substantial imports contributed to reduced domestic production even as Canadian consumption grew (The Tariff Board, 1978). Now, only one valley firm continues to process pears. As a result of the latest GATT negotiations, this preference was eliminated. Tariffs on the US apples and those imported under parallel trade agreements with New Zealand and South Africa have been similarly amended. Consequently, there should be some expansion of valley pear plantings soon (Lang, 1982), though full production from these trees cannot be expected for almost 15 years.

Industrial Incentives--While the current processing industry differs a great deal from that created under the Ottawa contracts, its roots and raison d'etre lie in the neophyte processors of that period. In the last 15 years, the three major processors of fruit products--the Scotian Gold Co-operative, Avon Foods, and Graves (Stokely-Van Camp)--have modernized and expanded to remain competitive in the Atlantic market. All three major processors have received DREE assistance through the Regional Development Incentives Act (RDIA) funding and prior to 1967 from its predecessor, the Area Development Agency of the former Department of Industry.

Since 1969, about $1.1 million in assistance has been provided through RDIA to the three

processors for a total of $4.3 million worth of improvements. An additional $1.6 million of funding (at almost 40% subsidy) was under consideration at the time of writing. These incentives include rebuilding Scotian Gold's main Coldbrook processing plant and Graves' fruit and vegetable processing facilities at Berwick, both destroyed by fire since 1980. These fires presented an opportunity to modernize a substantial portion of the apple processing capacity and eliminate an overcapacity for peel production. (Smaller crops and an increased proportion of fresh sales in the 1970s meant that only about 50% of capacity for peel products was being used.) While the industry is still too small to benefit significantly from economies of scale, especially in the case of pears, modernization of the present facilities could encourage expansion of markets, production, and therefore of land area.

In some cases, RDIA subsidies have contributed significantly to decisions to proceed with plant improvements (Lang, 1982). The continued stable price for processing apples, resulting in part from a competitive processing industry, is a major factor in the present strength of the industry and the consequent maintenance of orchard area.

The new Canadian Agricultural Market Development Fund also can be used by processors (5.3.1). Further opportunities for expanding domestic markets and production assistance in export marketing will also be available through CANAGREX. These can be expected to assist in orchard expansion or maintenance.

5.5 Federal Land-Use Impact Through Marketing

Federal programs in the marketing sector have assisted the industry in making adjustments to changing market situations and in exploiting those markets already available. Modest as the federal impact has been to date, the maintenance or expansion of fruit area has been encouraged nevertheless by federal activities. To the extent that markets have been maintained by federal programs, there has been a promotion of the total area of fruitland and therefore of orchard management and productivity, orchard capitalization, and fruitland location. Impacts on fruitland use through marketing are summarized later in Table 6.1.

The most significant federal impacts on land use through marketing have been in the substantial assistance to and restructuring of the industry during and after World War II with the Ottawa Contracts. Federal subsidies for bulk bin construction and plant modernization and expansion have also been an important input. Present research on low-oxygen storage could, if implemented, be a key to substantially increased sales by expanding domestic and export markets and by replacing imports, especially in the May to July period. Better quality fruit could also result in higher incomes for the industry, and expanding markets would encourage increased production and an increased land base. Some future federal activities, which hold promise for the industry include domestic promotion with funding for agricultural marketing to be expanded by Agriculture Canada (e.g. Canadian Agricultural Market Development Fund) and export promotion assistance (e.g. CANAGREX).

The new agricultural sub-agreement, which has not at time of writing been announced, may also have a significant impact on marketing, since marketing is a major new thrust of Agriculture Canada activities. With potentially expanding markets for Annapolis fruit, there is a possibility of increases in orchard area and further improvements in land management and productivity. The expected higher valley, as well as world, production may create future problems, however, in selling apples and therefore in maintaining the orchard industry and current land base.

6.0 SUMMARY AND PROSPECT

The federal government's impact on the Annapolis fruitland base, and on its location, management, and value has been longstanding, pervasive, and for the most part positive. A summary of these impacts is presented in Table 6.1. Portions of the table where no impacts are shown are considered to be effects that are so tenuous as to be beyond the analytical capability of this research (shown by dashes on the table).

Through the Ottawa contracts, which subsidized development of a local processing industry, and the Nova Scotia Apple Marketing Board, which created and stabilized the domestic market and provided the tree pulling/grafting bonuses, the federal government was largely responsible for the survival and transformation of the industry during and after World War II. This assistance encouraged a massive but orderly withdrawal of orchard area, which eliminated many poorly-managed farmstead orchards, often located in areas with less than adequate soil and climatic conditions for fruit production. Orcharding has been progressively concentrated since that time on larger units occupying better land closer to infrastructure.

The Tree Fruit (planting) incentive (1976-1981) has financed and contributed to a substantial expansion of the land base, though good world prices since 1975 and a number of other federal, provincial, and municipal programs and actions have also been significant factors. The incentive has helped to increase average orchard area and has encouraged the use of a better land base and of new technologies, such as the growth-controlling rootstocks. Based on current plantings, a recent industry study projects that by 1985 production will increase to 67 tonnes, or about 45% higher than the 1976-1980 period (Hennigar, 1980). The processing sector is expected to take only about 20% of this increased total production. While this projection is perhaps an overstatement, the processing sector will probably continue to decline in relative importance until Annapolis fresh/processing proportions better reflect the national average of 60/40. The expansion of production will present a serious challenge for the marketing of fresh apples, particularly if world production continues to increase (Arsenault, 1980). The Tree Fruit (planting) incentive consequently has contributed to future marketing challenges for the fresh product. The response of Agriculture Canada to the need for marketing assistance is especially timely for Annapolis fruit producers.

Federal support for marketing and marketing infrastructure in the industry has increased in recent years and will continue to do so (Agriculture Canada, 1981). Bulk Bin Construction assistance, for example, helps to raise product quality and therefore increases marketability. The resulting higher prices and sales encourage expansion of area, adoption of improved management practices, and use of more optimal land resources. The loans for refrigerated containers could have a similar impact on exports, but these efforts have been limited by the very competitive

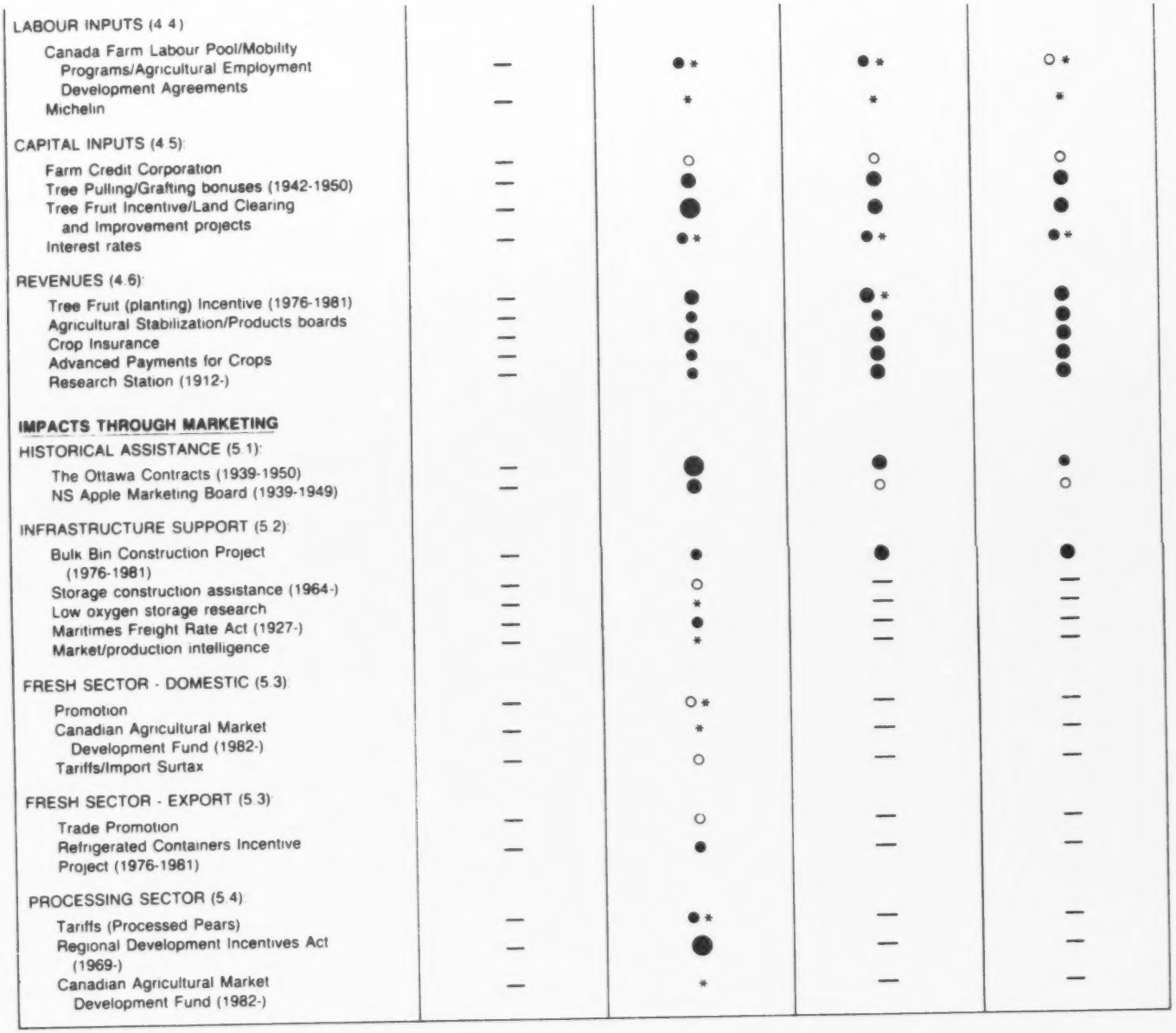
TABLE 6.1
Summary of the Impact of Federal Activities on Fruitland Use, Annapolis Valley

Significance of Impact

○ No Impact ● ● ● Very Significant

* Future

Federal Activity	Land-Use Impacts: Fruitland Location	Total Fruitland Area	Orchard Management/ Productivity	Orchard Capitalization/ Value
IMPACTS ON DEMAND FOR FRUITLAND				
ORCHARD USE OF FRUITLAND (3.2)				
Tree-Pulling bonuses (1942-50)	●	●	●	○
Apple Maggot Control Board (1931-)	●	●	●	○
Land Improvement Policy (1971-1975)	○	○	○	○
Land Clearing and Improvement Project (1976-1981)	○	●	○	○
Tree Fruit (planting) Incentive (1976-1981)	●	●	●	●
ENCROACHMENTS ON FRUITLAND (3.3)				
Canada Mortgage and Housing Corporation (CMHC) Programs	●	○	—	—
Federal Land	●	○	—	—
Highway 101	○	○	—	—
Canada Land Inventory (CLI)	● *	● *	—	—
Soils mapping	*	*	—	—
Land Registation and Information Service (LRIS)	*	*	—	—
Michelin	*	*	—	—
IMPACTS THROUGH PRODUCTION ECONOMICS				
LAND INPUTS (4.2)				
Tree Pulling bonuses (1942-1950)	—	—	●	○
Farm Enlargement and Consolidation Program (1965-1971)	—	—	○	○
Tree Fruit (planting) Incentive (1976-1981)	—	—	● *	●
MANAGEMENT (4.3)				
Tree Pulling/Grafting bonuses (1942-1950)	—	—	●	●
Apple Maggot Control Board (1931-)	—	—	●	○
Land Improvement Policy (1971-1975)	—	—	●	○
Land Clearing and Improvement Project (1976-1981)	—	—	●	○
Tree Fruit (planting) Incentive (1976-1981)	—	—	● *	●
Research Station (1912-) - research, education	—	●	●	●
Weather Service	—	○	●	○


LABOUR INPUTS (4.4)
Canada Farm Labour Pool/Mobility Programs/Agricultural Employment Development Agreements
Michelin
CAPITAL INPUTS (4.5)
Farm Credit Corporation
Tree Pulling/Grafting bonuses (1942-1950)
Tree Fruit Incentive/Land Clearing and Improvement projects
Interest rates
REVENUES (4.6)
Tree Fruit (planting) Incentive (1976-1981)
Agricultural Stabilization/Products boards
Crop Insurance
Advanced Payments for Crops
Research Station (1912-)
IMPACTS THROUGH MARKETING
HISTORICAL ASSISTANCE (5.1)
The Ottawa Contracts (1939-1950)
NS Apple Marketing Board (1939-1949)
INFRASTRUCTURE SUPPORT (5.2)
Bulk Bin Construction Project (1976-1981)
Storage construction assistance (1964-)
Low oxygen storage research
Maritimes Freight Rate Act (1927-)
Market/production intelligence
FRESH SECTOR - DOMESTIC (5.3)
Promotion
Canadian Agricultural Market Development Fund (1982-)
Tariffs/Import Surtax
FRESH SECTOR - EXPORT (5.3)
Trade Promotion
Refrigerated Containers Incentive Project (1976-1981)
PROCESSING SECTOR (5.4)
Tariffs (Processed Pears)
Regional Development Incentives Act (1969-)
Canadian Agricultural Market Development Fund (1982-)

British market. Federal assistance in promotion has not yet been a significant factor in either domestic or export markets, but could play quite a significant role in future. Research on low-oxygen storage could also expand fruitland by extending the length of the domestic marketing season and therefore the market for Annapolis apples.

The federal research program at the Kentville Station has pioneered and continued work on integrated pest management and the testing of rootstocks and varieties under local conditions. Its advisory program for growers has contributed to better orchard care and fruit quality, more intense land use, and the use of a more optimal land base. The station has therefore assisted in increasing the level of capitalization, the size of orchard units, and the specialization of farms with orchard components. These inducements to greater total orchard area have, nevertheless, been more than offset by increasing orchard density thus far.

The Crop Insurance Program, the federal safety net, and Advanced Payments protect against years of low yields or poor markets and cash flow difficulties. By taking the very low income years out of the picture, these programs provide stability for investment planning, assisting growers and keeping their expertise and management skills in place. These programs also allow continued improvement of farm infrastructure and management practices and expansion of orchard size.

Assistance to Annapolis processors in the last 15 years has helped to modernize and increase efficiency in this sector of the industry. Greater stability in the market because of the processing outlet has in turn encouraged recent planting, which maintains the orchard land base, and investment in technology and management.

On the other hand, federal and provincial funding for a Michelin Tire Plant at Waterville-Cambridge increases the potential for higher than planned population growth. This would test the Municipal Development Plan's ability to control agricultural land consumption. Farm labour, particularly skilled labour, could also be in short supply when the plant is staffed, though labour shortages might be mitigated by shift-workers and their families.

The recent high interest rates have had serious effects in certain sectors of the agricultural industry. It remains to be seen what the impact has been on land use for orcharding in the valley. Higher interest rates in the provincial farm credit system will have slowed investment and therefore the trends in land-base adjustment and management practices discussed above. Smaller growers may also have been compelled to withdraw from orcharding.

In addition, the new agricultural sub-agreement, currently being negotiated between federal and provincial governments, will likely continue to provide assistance to the industry.

It should be borne in mind that federal programs are carried out in the context of provincial and municipal policies and activities, and industry actions, which can affect significantly the delivery of any particular program. For example, the Tree Fruit Incentive was 20% provincially-funded

and was delivered by the Province. Also, the private industry's resistance to central marketing has limited the federal government's ability to affect marketing of Annapolis fruit, the key factor in the industry's health. Consequently, the impact of federal activities cannot and should not be viewed in isolation. Nevertheless, it is clear that federal programs have influenced and continue to influence fruitland use in the Annapolis in a number of ways:

1) maintaining total orchard area at appropriate levels (based on current and expected market conditions);
2) changing the pattern of land use towards the utilization of a better land base for fruit production;
3) intensification of use and improved management, consequently increasing productivity (per hectare of orchard);
4) increasing capitalization of orchards.

Increases in fruitland area and potential productivity, which have been largely federally initiated, provide the industry with a number of challenges. The effect of federal marketing assistance on fruitland use has so far been minimal, though new marketing initiatives by Agriculture Canada could help meet upcoming marketing problems and contribute to the maintenance or expansion of the land area and improvement of management of the fruitland base.

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TABLE A.1

Apple Tree Plantings and Removals, 1939 to 1980

Period/Year	Plantings ('000's)	Removals ('000's)	Net Effect ('000's)	Funding
1939-49	200	664	-464	Approximately $1,645K removal bonus; 53K trees. (See also Table A.1).
(per annum, in brackets)	(20)	(66)	(-46)	
1950-54	31[e]	513	-482[e]	1950--280K trees removed- $400K.
	(6)	(103)	(-96)	
1955-59	27[e]	170	-143[e]	
	(6)	(34)	(-29)	
1960-64	117[e]	139	-22[e]	
	(23)	(28)	(-4)	
1964-66	112	ND	----	
	(37)	ND	----	
1964-69	ND	ND	+127	
			(+25)	
1964-67	155	ND	----	
	(39)	ND	----	
1967	44	ND	----	
1969, 1970	45[e]	ND	----	
	(23)			
1971	25	58	-33[e]	
1972	22	49	-27[e]	
1973	39	ND	----	
1974	56	ND	----	
1975	40	ND	----	Canada-Nova Scotia Sub-agreement (1976-80):
1976	34	ND	----	$68K.
1977	41	ND	----	$82K.
1969 to 1977	267	247	+20	NA
	(30)	(27)	(+2)	NA
1978	43	ND	+3	$86K.
1979	63	ND	----	$126K.
1980	53	ND	----	$106K.
1976 to 1980	233	ND	----	$466K.
	(47)			

NOTES: ND--No data.
NA--Not applicable.
[e] Estimates based on combined sources.

SOURCES: Derived from B. Kinsman (1979); Dominion Bureau of Statistics (1968b); Redmond and Embree (1974); Embree (1978); Craig (1980).

TABLE A.2

The Ottawa Contracts, 1939 to 1950

Year	Terms/Federal Assistance	Funding/Comments
1939	Zoned national market. Purchase of 85,700 tonnes (85.7K t) by federal Department of Agriculture for processing.	Crop--113K t.
1940	Market no longer zoned. Guarantee of 80% of average for 1936 to 1938 net return for 85% of average exports of that period up to 65.7K t.	Severe windstorm/reduced crop--65.8K t.
1941	Guaranteed price for 85.7K t. Processing purchases. Deficiency bonus if crop less than 71.4K t.	$929K. $416K.
1942	Subsidies for sales of dried apples in Canada and Britain. Processing purchases of 7.3K t of dried apples (dried weight). Deficiency bonus. $2/tree bonus for removal of 78K trees.	Total of $1,865K to industry; $666K to processors ($476K recovered from British sales). $118K. $156K.
1943	Subsidy of up to 7.3K t of dried apples. Actual 4.9K t at 34.3c/kg (kilogram). 54K trees removed under bonus.	Total--$1,785K. $108K.
1944	Subsidy of 19.8c/kg up to 6.9K t. Purchase of dried apples up to 4.1K t. Sales of 2.4K t to UK. Rise in ceiling price for dried apples. 15K trees removed under bonus.	$1,072K. $30K.
1945	Subsidies: 19.8c/kg up to 6.9K t of dried apples; 7.9c/kg up to 1.8 million 105 fl. oz. tins of choice canned apples. Purchase: at 42.4c/kg fob plant (44c/kg fob f.a.s.) up to 4.1K t dried apples. Up to $100,000 for tree removal. 17K trees pulled ($2/tree).	$21K--dried. $38K--canned. $56K--Commodity Price Stabilization Board (fresh). $34K.
1946	Subsidized up to $1,400K on fresh sales. Up to $200,000 for tree removal @ $2/tree--58K trees pulled.	$757K. $116K.
1947	Guaranteed minimum average return from Price Support Board. Purchase of up to 11.4K t not readily saleable; disposed of in other markets. No tree removal grants.	
1948	Prices Support Board underwrote 70% of crop. $4/tree bonus for removal--172K trees removed. Grafting subsidy--26K trees.	Short crop--44K t. $688K.
1949	Subsidized exports to Britain of 29.7K t. 128K trees removed under bonus. Grafting subsidy 14K trees.	$1,583K.

1950	No contract; grant.	
	280K trees removed under bonus.	$300K.
	Total trees pulled under federal bonus 1942 to 1950--811K.	At least $2,300K in total.
	Total grafting subsidy--40K trees.	$109K.

SOURCE: Derived from Morse (1952).

TABLE A.3

Tree-Pulling Bonuses, 1942 to 1950

Year	Number of Trees Pulled ('000's)	Estimated Total Bonus ($'000's)	Bonus Per Tree
1942	78	$ 156	$2
1943	54	$ 108	$2
1944	15	$ 30	$2
1945	17	$ 34	$2
1946	58	$ 116	$2
1947	NIL	----	None
1948	172	$ 688	$4
1949	128	$ 512	$4
1950	280	$ 400	Approx. $1.43
	811	$2,044	

SOURCE: Compiled from Morse (1952).

TABLE A.4

Production and Farm Value of Nova Scotia Tree-Fruit Crops, 1871 to 1980

	Apples			Pears		Plums	
Year/Period	Mean Production (000's tonnes)[a] (1 tonne=52.5 bu.)	Change	Mean Current Farm Value ($000,000)	Mean Production (1 tonne=44.1 bu.)	Mean Current Farm Value ($000)	Mean Production (1 tonne=44.1 bu.)	Mean Current Farm Value ($000)
1871	4	---					
1881	13	+173%					
1891-1895	12	-9%					
1896-1900	22	+89%					
1901-1905	24	+11%					
1906-1910	32	+33%					
1911-1915	56	+74%					
1916-1920	55	-1%					
1921-1925	92	+67%					
1926-1930	69	-25%					
1931-1935	109	+56%					
1936-1940	104	-4%	3.2				
1941-1945	71	-32%	3.3	575	34	190	18
1946-1950	68	-3%	2.8	550	40	250	33
1951-1955	37	-86%	1.6	945	79	320	29
1956-1960	42	+15%	1.5	740	59	160	16
1961-1965	55	+29%	2.7	1,150	94	105	12
1966-1970	58	+6%	3.1	1,480	122	95	12
1971-1975	44	-24%	3.7	1,440	184	115	27
1976-1980	46	+4%	6.4	1,585	303	220	63

NOTES: [a] Data for 1891-1920 are converted from barrels to tonnes, with a 96-quart barrel; 1921-1940 based on a 112-quart barrel (Morse, 1952). Production data for 1891 to 1929 are for "shipments" only (Morse, 1952). Data for 1871 and 1881 are for the three counties.

SOURCES: Prepared from 1871-1935--Morse (1952); 1936-1955--Canada Department of Trade and Industry (1968); 1941-1980--Nova Scotia Department of Agriculture and Marketing (1976a, 1981a).

TABLE A.5

Changes in Apple Variety Use, 1939 to 1981

Rank in 1939	Variety (Purpose)[a]	Percentage of Trees					Absolute Change in Use, 1973 to 1981
		1939	1949	1964	1973	1981	
(11)	McIntosh (F)	3.5%	9.3%	19.4%	24.9%	26.1%	+57%
(14)	Cortland (D)	1.4%	3.2%	7.2%	9.1%	12.0%	+98%
(13)	Red Delicious (F)	2.5%	6.8%	14.7%	13.4%	11.6%	+30%
(5)	Gravenstein/ Crimson G. (D)	7.0%	8.4%	9.7%	9.8%	11.3%	+72%
(6)	Spy (D)	5.8%	6.7%	10.6%	12.2%	10.5%	+29%
(-)	Idared (D)	>1.0%	>1.0%	>1.0%	>1.0%	4.5%	+361%
(-)	Spartan (F)	>1.0%	>1,0%	1.2%	3.7%	3.6%	+47%
(7)	King (P)	5.8%	4.8%	5.2%	4.1%	3.0%	+1%
(3)	Wagener (P)	9.6%	11.4%	9.4%	3.6%	2.1%	-13%
(21)	Greening (P)	>1.0%	>1.0%	1.8%	3.2%	2.1%	-1%
(2)	Ben Davis/Gano (P)	11.4%	11.0%	4.4%	2.4%	1.4%	-12%
(4)	Baldwin (P)	8.8%	6.1%	1.5%	>1.0%	>1.0%	-27%
(1)	Stark (D)	11.6%	8.5%	>1.0%	>1.0%	>1.0%	ND

NOTES: ND--No data.
[a] D--Dual; F--Fresh; P--Processing.

SOURCES: Prepared from 1939--Collins (1941); 1949--Nova Scotia Department of Agriculture and Marketing (1951); 1964, 1973--Redmond and Embree (1965, 1974); 1981--Statistics Canada and Nova Scotia Department of Agriculture and Marketing (1981); Purpose designations--after Embree (1978).

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